

This document gives pertinent information concerning the reissuance of the VPDES Permit listed below. This permit is being processed as a **Major, Municipal** permit. The discharge results from the operation of a 2.2 mgd wastewater treatment plant. The effluent limitations and special conditions contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-05 et seq.

1. Facility Name and Mailing Address: MCB Quantico –Mainside Advanced STP      SIC Code :    4952  
3250 Catlin Avenue  
Quantico, VA 22134  
  
Facility Location: 658 Epperson Avenue      County: Prince William  
Quantico, VA 22134  
  
Facility Contact Name: Dave Crosley      Telephone Number: 703-784-0157
2. Permit No.: VA0028363      Expiration Date of previous permit: 4/1/2008  
  
Other VPDES Permits associated with this facility: VA0028371, VA002151, VAN010043, VAR051810  
Other DEQ Permits associated with this facility: Air – Registration No. 72827, Stage II Registration No. 153S0100  
Waste – EPA ID No. VA1170024722  
  
E2/E3/E4 Status : N/A
3. Owner Name: United States Marine Corps  
Owner Contact/Title: Carl J. Morgans      Telephone Number: 703-784-5201
4. Application Complete Date: 12/20/07  
Permit Drafted By: Anna Westernik      Date Drafted: 1/8/08  
Draft Permit Reviewed By: Alison Thompson      Date Reviewed: 1/29/08  
Public Comment Period : Start Date: 8/16/08      End Date: 9/16/08
5. Receiving Waters Information: See **Attachment 1** for the Flow Frequency Determination  
Receiving Stream Name : UT to Quantico Bight of the Potomac River  
Drainage Area at Outfall: Unknown      River Mile: 80.59  
Stream Basin: Potomac River      Subbasin: Potomac River  
Section: 5      Stream Class: II  
Special Standards: b      Waterbody ID: VAN-A26E  
7Q10 Low Flow: Tidal      7Q10 High Flow: Tidal  
1Q10 Low Flow: Tidal      1Q10 High Flow: Tidal  
Harmonic Mean Flow: Tidal      30Q5 Flow: Tidal  
303(d) Listed: Yes      30Q10 Flow: Tidal  
TMDL Approved: Yes (PCBs)      Date TMDL Approved: 10/31/07
6. Statutory or Regulatory Basis for Special Conditions and Effluent Limitations:  

<input checked="" type="checkbox"/> State Water Control Law	<input type="checkbox"/> EPA Guidelines
<input checked="" type="checkbox"/> Clean Water Act	<input checked="" type="checkbox"/> Water Quality Standards (VA and MD)
<input checked="" type="checkbox"/> VPDES Permit Regulation	<input checked="" type="checkbox"/> Other (9 VAC 25-415-10, et. seq, Policy
<input checked="" type="checkbox"/> EPA NPDES Regulation	for the Potomac River Embayments)
7. Licensed Operator Requirements: Class I
8. Reliability Class: Class I

**9. Permit Characterization:**

<input type="checkbox"/> Private	<input checked="" type="checkbox"/> Effluent Limited	<input checked="" type="checkbox"/> Possible Interstate Effect
<input checked="" type="checkbox"/> Federal	<input checked="" type="checkbox"/> Water Quality Limited	<input type="checkbox"/> Compliance Schedule Required
<input type="checkbox"/> State	<input checked="" type="checkbox"/> Toxics Monitoring Program Required	<input type="checkbox"/> Interim Limits in Permit
<input type="checkbox"/> POTW	<input type="checkbox"/> Pretreatment Program Required	<input type="checkbox"/> Interim Limits in Other Document
<input checked="" type="checkbox"/> TMDL		

**10. Wastewater Sources and Treatment Description:**

Influent flow enters the plant through the headworks, which consists of a grit removal system and two barscreens. If the flow is excessive, overflow will enter an equalization basin located near the headworks. A mechanical barscreen is normally used; however, the manual barscreen is maintained as a backup. Grit and barscreen debris are conveyed by a belt to a dumpster and disposed of in a landfill.

Effluent from the headworks enters two primary treatment units that operate in parallel. Caustic soda is added at this location for pH adjustment. Approximately 90% of the sludge from these units is wasted to the digester. The effluent exiting the primary treatment units combines in a wetwell located before the denitrification basin with mixed liquors suspended solids (MLSS) from the aeration basin and returned activated sludge (RAS) from the clarifiers. Wetwell effluent enters the denitrification basin where caustic soda is added for pH adjustment. From the denitrification basin, effluent enters the nitrification basins. Four nitrification basins are present. Alum is added in the nitrification basins for phosphorus control.

Effluent leaving the nitrification basins flows to secondary clarifiers. Three secondary clarifiers are present; however, only two of the clarifiers are normally online. Polymer is added at the clarifiers to aid in settling. RAS is sent from the clarifiers to the denitrification basin; WAS and scum are sent to the primary treatment units located at the headworks. This treatment plant has four RAS pumps, two WAS pumps, and two scum pumps.

The effluent is treated by two polishing filters after leaving the clarifiers. This filtering is effective in the removal of suspended solids and phosphorus and increases the efficiency of UV disinfection. Filter media consists of three grades of sand and anthracite. The polishing filters are backwashed when the pressure reaches approximately 100 psi. Flow from the filters enters the old chlorine contact tank where it is aerated and then the UV light treatment train. Backwash from the filters is pumped to the primary treatment units at the head of the plant.

Disinfection is via UV light. Two meters located after UV disinfection are used so that adjustment could be made for the tide when flow was measured.

The outfall discharges into an artificial slow-flowing channelized area near a road. There is minimal algal growth in this area, evidence of healthy emergent aquatic vegetation, and fish. Flow travels through a culvert under the road into an unnamed tributary of the Potomac River, Quantico Bight.

See **Attachment 2** for a facility schematic/diagram.

TABLE 2 – Outfall Description				
Outfall Number	Discharge Sources	Treatment	Design Flow	Outfall Latitude and Longitude
001	Domestic and/or Commercial Wastewater	See Item 10 above.	2.2 mgd	38° 30' 53.7" N 77° 17' 55.2" W
<b>Attachment 3</b> consists of USGS Topographic Map 194D (Quantico Quad) showing the location of Outfall 001 in relation to the mainstem of the Potomac River and its tributaries.				

**11. Discharges, Intakes, Monitoring Stations, Other Items in Vicinity of Discharge .**

TABLE 3 - Discharges, Intakes, Monitoring Stations, Other Items in Vicinity of Discharge		
Description	Location	Description
VA002071 (Industrial Major)	Quantico Creek	Virginia Electric Power Company -- Steam Electric Power Plant <u>Outfalls 001 /002, 003:</u> Once-through, non-contact cooling water and cooling tower blowdown. <u>Outfall 004:</u> Low volume wastes, storm water. <u>Outfall 005:</u> Ash Pond E. Ash sluice water, Ash Pond D surface decant, storm water, metals cleaning waste basin, and oily waste basin. <u>Outfall 007.</u> Intake Screen Backwash Water. (Units 1-4 cooling water intake structures) <u>Outfall 008.</u> Intake Screenwell Freeze Protection Water. (Non-contact cooling water)
Monitoring Station	38° 31' 47" 77° 15' 56"	MD Department of Natural Resources Monitoring Station TF 2.4
VA0002151 (Industrial Major)	Potomac River, Chopawamsic Creek, Beaverdam Creek	Quantico Industrial (24 industrial storm water outfalls).
VAR051810	38° 30' 53.9" N 77° 17' 55.2" W	Quantico Mainside General SW Permit
Virginia Electric Power Intakes	Potomac River	Intakes for makeup water for steam electric power plant activities (primarily once-through non-contact cooling water).

**12. Material Storage:** See **Attachment 4**.**13. Site Inspection:** Performed by Anna Westernik and Beth Biller on October 16, 2007 (see **Attachment 5**).**14. Receiving Stream Water Quality and Water Quality Standards:**a) Ambient Water Quality Data

Outfall 001 (located in Waterbody VAN-A26E) discharges into an unnamed tributary of Quantico Bight, a Potomac River embayment, and then into the Potomac River. The Department of Environmental Quality, Northern Regional Office (DEQ-NRO) does not monitor Quantico Bight or the Potomac River in the vicinity of the Quantico Mainside STP.

The Maryland Department of Natural Resources (DNR) maintains an ambient monitoring station (TF2.4) approximately 2 miles northeast of Outfall 001 on the Potomac River between Possum Point and Moss Point. Some of the parameters monitored at this station include dissolved oxygen (DO), biological oxygen demand (BOD), total suspended solids (TSS), pH, temperature, salinity, conductivity, and nutrients. **Attachment 6** consists of a map showing this monitoring station and the location of Outfall 001 in relation to this station.

The receiving stream is not included on the current 303(d) list. However, based on the 2006 Intergrated Report, there are two impairments listed for Virginia's portion of the Potomac River embayment, a fish consumption advisory and a dissolved oxygen impairment (see **Attachment 7**, Planning Statement for the Quantico Mainside WWTP). A TMDL for PCBs was prepared for the Potomac River and approved by EPA on October 31, 2007.

Significant portions of the Chesapeake Bay and its tributaries are listed as impaired on Virginia's 303(d) list of impaired waters for not meeting the aquatic life use support goal, and the 2006 Virginia Water Quality

Assessment 305(b)/303(d) Integrated Report indicates that much of the mainstem Bay does not fully support this use support goal under Virginia's Water Quality Assessment guidelines. Nutrient enrichment is cited as one of the primary causes of impairment.

In response, the Virginia General Assembly amended the State Water Control Law in 2005 to include the *Chesapeake Bay Watershed Nutrient Credit Exchange Program*. This statute set forth total nitrogen and total phosphorus discharge restrictions within the bay watershed. Concurrently, the State Water Control Board adopted new water quality criteria for the Chesapeake Bay and its tidal tributaries. These actions necessitate the evaluation and the inclusion of nitrogen and phosphorus limits on discharges within the bay watershed.

b) Receiving Stream Water Quality Criteria

Part IX of 9 VAC 25-260(360-550) designates classes and special standards applicable to defined Virginia river basins and sections. The receiving stream, UT to Quantico Bight of the Potomac River, is located within Section 5 of the Potomac River Basin and is designated as a Class II water.

Although Quantico Bight is within State Waters of Virginia, the mainstem of the Potomac River is Maryland waters. The Outfall 001 discharge point is approximately 0.4 miles due west from the political boundary of Maryland and the discharge has the potential to affect Maryland waters. Title 26, Subtitle 08 of the Code of Maryland Regulations (Maryland Water Quality Criteria) (**Attachment 8**) has been reviewed, and the limitations proposed herein should comply with these regulations.

Virginia Class II tidal waters in the Chesapeake Bay and its tidal tributaries must meet dissolved oxygen concentrations as specified in 9 VAC 25-260-185 and maintain a pH of 6.0-9.0 standard units as specified in 9 VAC 25-260-50. In the Northern Virginia area, Class II waters must meet the Migratory Fish Spawning and Nursery Designated Use from February 1 through May 31. For the remainder of the year, these tidal waters must meet the Open Water use. The applicable dissolved oxygen concentrations are presented in **Attachment 9**.

Maryland Water Quality criteria state that pH values must be maintained between 6.5 and 8.5 S.U and the dissolved oxygen criteria be not less than 5 mg/L at any time.

**Attachment 10** details other Virginia water quality criteria applicable to the receiving stream. The Quantico Mainside discharge is located in a transition zone between estuarine and tidal freshwater. The transition zone includes all tidal tributaries that enter the Potomac River from Buoy 43 to 33 near Dahlgren, Virginia. Since the more stringent of either the freshwater or saltwater criteria apply in the transition zone, freshwater criteria apply to the discharge from the Quantico Mainside WWTP.

Ammonia:

Ammonia criteria for Apr-Oct was assessed using a 90<sup>th</sup> percentile pH value of 7.7 derived from a mixture of effluent and river water values and a historical default temperature values of 25 °C. Ammonia criteria for Nov-Mar was assessed using a 90<sup>th</sup> percentile pH value of 7.7 derived from a mixture of effluent and river values and a historical default temperature value of 15 °C. These values were used to determine ammonia criteria when the Quantico Mainside WWTP permit was reissued in 1997, modified in 2001, and reissued in 2003.

**Attachment 10** shows the Virginia acute and chronic criteria calculated using these values (58 mg/L and 3.7 mg/L for Apr-Oct and 58 mg/L and 7.0 mg/L for Nov-Mar) and **Attachment 8** shows the Maryland acute and chronic criteria of 14.4 mg/L (Salmonids Absent) and 1.8 mg/L for Apr-Oct and 14.4 mg/L and 3.4 mg/L for Nov-Mar.

Metals Criteria:

The Water Quality Criteria for some metals are dependent on the receiving stream's hardness (expressed as mg/L calcium carbonate). The average hardness of the receiving stream could not be determined from stream sampling data and it is not appropriate to use effluent hardness to determine metals criteria due to high dilution of the effluent in the receiving stream. Therefore, per DEQ Guidance, a default hardness of 50 mg/L will be used to calculate metals criteria. The hardness-dependent metals criteria shown in **Attachment 10** are based on this value. These criteria are the same of that for the State of Maryland.

Bacteria Criteria: The Virginia Water Quality Standards (9 VAC 25-260-170 B.) states sewage discharges shall be disinfected to achieve the following criteria:

*E. coli* and enterococci bacteria per 100 ml of water shall not exceed the following:

	Geometric Mean <sup>1</sup>	Single Sample Maximum
Freshwater <i>E. coli</i> (N/100 ml)	126	235
Saltwater[and Transition Zone <sup>2</sup> ] enterococci	35	104

<sup>1</sup>For two or more samples [taken during any calendar month].

<sup>2</sup>See 9 VAC 25-260-140 C for fresh[water] and transition zone delineation

The Maryland Water Quality Criteria Specific to Designated Uses (Code of Maryland Regulations 26.08.02.03-3.A) states that sewage discharges shall be disinfected to achieve the following criteria:

The single sample maximum allowable density for *E. coli* and enterococci bacteria per 100 ml of water for all areas shall be as follows:

	Geometric Mean <sup>1</sup>	Single Sample Maximum
Freshwater <i>E. coli</i> (N/100 ml)	126	235
Freshwater enterococci	33	61
Marine water enterococci	35	104

The Quantico Mainside WWTP discharges to a transition zone that is not considered marine water.

c) Receiving Stream Special Standards

The State Water Control Board's Water Quality Standards, River Basin Section Tables (9 VAC 25-260-360, 370, and 380) designates the river basins, sections, classes, and special standards for surface waters of the Commonwealth of Virginia. The receiving stream, an unnamed tributary of Quantico Bight, is located within Section 5 of the Potomac River Basin. This section has been designated a Class II water with a special standard of b.

Special Standard "b" (Potomac Embayment Standards) established effluent standards for all sewage plants discharging into Potomac River embayments and for expansions of existing plants discharging into non-tidal tributaries of these embayments. 9 VAC 25-415, Policy for the Potomac Embayments controls point source discharges of conventional pollutants into the Virginia embayment waters of the Potomac River, and their tributaries, from the fall line at Chain Bridge in Arlington County to the Route 301 Bridge in King George County. The regulation sets effluent limits for BOD<sub>5</sub>, total suspended solids, phosphorus, and ammonia, to protect the water quality of these high profile waterbodies.

d) Threatened or Endangered Species

The Virginia DGIF Fish and Wildlife Information System Database was searched for records to determine if there are threatened or endangered species in the vicinity of the discharge. The following threatened or endangered species were identified within a two mile radius of the discharge: bald eagle, bridge shiner (fish), timber rattlesnake, and northern river otter. The limits proposed in this draft permit are protective of

the Virginia Water Quality Standards and therefore, protect the threatened and endangered species found near the discharge.

The Potomac River is within a reach identified as having an Anadromous Fish Use. It is staff's best professional judgment that the proposed limits are protective of this use.

**15. Antidegradation (9 VAC 25-260-30):**

All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

Staff has determined that the receiving waters, an UT to Quantico Bight, are Tier 1 due to nutrient enrichment, aquatic toxicity from other sources, contamination from the adjacent "old landfill", and loss of the "fishable" designated use through fish and shellfish bans. Fish consumption use is categorized as impaired due to a Virginia Department of Health, Division of Health Hazards Control PCB fish consumption advisory. The advisory, dated April 19, 1999 and modified on December 13, 2004, limits consumption of selected fish. The affected area includes the tidal portion of embayments and selected tributaries from the I-395 Bridge (above the Woodrow Wilson Bridge) to the Potomac River Bridge at Route 301. Quantico Bight is included of the area affected by this advisory. For Tier 1 waters, antidegradation is addressed by ensuring that the effluent limits result in compliance with the water quality criteria.

**16. Effluent Screening, Wasteload Allocation, and Effluent Limitation Development :**

a) Effluent Screening and Wasteload Allocations

Staff derived wasteload allocations where parameters are reasonably expected to be present in an effluent discharged (e.g., total residual chlorine where chlorine is used as a means of disinfection) and where effluent data indicate the pollutant is present in the discharge above quantifiable levels. With regard to the Outfall 001 discharge, ammonia as N is likely present being that this is a WWTP treating sewage, total residual chlorine may be present since backwash water from a water treatment plant discharges into the collection system and chlorine may be used to disinfect the sandfilters, and monitoring data in the permit application and discharge monitoring reports indicate that copper, selenium, and zinc are present in the discharge (**Attachment 11** is a summary of effluent data). Current DEQ guidance does not recommend calculating seasonal WLAs for any toxic pollutants except ammonia.

- 1) Acute WLAs: DEQ Guidance Memorandum 00-2011 states that for surface discharges into tidal areas the acute wasteload allocation (WLA<sub>a</sub>) should be set at two times the acute standard because initial mixing in these circumstances is limited and lethality in the allocated impact zone must be prevented. The 2x factor is based on the acute standard or Criteria Maximum Concentration (CMC) being one half of the Final Acute Value (FAV) for a specific toxic pollutant.

In the case of Outfall 001 of the Quantico Mainside WWTP, a 10:1 dilution ratio, based on a mixing zone study, will be applied in determining the acute WLAs (see **Attachment 12**).

- 2) Chronic WLAs: DEQ Guidance Memorandum 00-2011 states that for surface discharges into tidal areas the chronic wasteload allocation (WLA<sub>c</sub>) should be based upon site specific data on waste dispersion or dilution when available and appropriate. Where wastewater dispersion/dilution data are not available, a dilution ratio of 50:1 may be used.
- 3) Human Health WLAs: Wastewater dispersion/dilution data are not available for the calculation of the human health wasteload allocation (WLA<sub>h</sub>). Therefore, in accordance with DEQ policy for discharge into tidal areas, calculation of the WLA<sub>h</sub> shall be based on a dilution ratio of 50:1.

- b) Effluent Limitations Toxic Pollutants, Outfall 001 – 9 VAC 25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Those parameters with WLAs that are near effluent concentrations are evaluated for limits.

The VPDES Permit Regulation at 9 VAC 25-31-230.D requires that monthly and weekly average limitations be imposed for continuous discharges from POTWs and monthly average and daily maximum limitations be imposed for all other continuous non-POTW discharges.

1) Ammonia as N/TKN:

The April-October limits are based on the Policy for the Potomac River Embayments (9 VAC 25-415-10 et seq.), which are more stringent than both the Virginia and Maryland water quality criteria. Winter ammonia limits (November-March) were removed when the permit was modified in March 2003. A mixing zone study for Quantico Bight conducted in October 2000 (**Attachment 12** is an excerpt from this study) showed a 10:1 and 50:1 dilution ratio for acute and chronic criteria, respectively. Based on this mixing zone study, the Quantico Mainside WWTP permit was modified on October 12, 2001 and the winter limits for ammonia were removed.

Winter limits were calculated using Maryland water quality criteria. There is no need for winter limits (November-March) because of the dilution factor (**Attachment 13**).

2) Total Residual Chlorine:

Although this sewage treatment plant does not chlorinate the discharge, chlorine is present in the influent because the treatment plant receives backwash water from the water treatment plant and chlorine may be used to clean the sandfilters at the sewage treatment plant. Staff calculated the WLAa and WLAc for TRC using dilution ratios of 10:1 and 50:1, respectively. In accordance with current DEQ guidance, staff derived TRC limits using a default data point of 0.2 mg/L and the calculated WLAs. Per DEQ guidance, numeric limits for total residual chlorine (TRC) must be imposed in the permit even where limits are less than the detection level of 0.1 mg/L. A monthly average of 0.094 mg/L and a weekly average limit of 0.113 mg/L are proposed for this discharge. (see **Attachment 13**).

3) Metals/Organics:

No limits are needed (see **Attachment 13**).

- c) Effluent Limitations and Monitoring, Outfall 001 – Conventional and Non-Conventional Pollutants  
No changes to dissolved oxygen (DO), carbonaceous biochemical oxygen demand-5 day (cBOD<sub>5</sub>), total suspended solids (TSS), and phosphorus limits are proposed. pH and enterococci limits have been changed to ensure compliance with the Maryland Water Quality Criteria.
- d) Effluent Annual Average Limitations and Monitoring, Outfall 001 – Nutrients  
VPDES Regulation 9 VAC 25-31-220(D) requires effluent limitations that are protective of both the numerical and narrative water quality standards for state waters, including the Chesapeake Bay.

As discussed in Section 15, significant portions of the Chesapeake Bay and its tributaries are listed as impaired with nutrient enrichment cited as one of the primary causes. Virginia has committed to protecting and restoring the Bay and its tributaries.

The State Water Control Board adopted new Water Quality Criteria for the Chesapeake Bay in March 2005. In addition to the Water Quality Standards, there are three new regulations that necessitate nutrient limitations:

- 9 VAC 25-40 - *Regulation for Nutrient Enriched Waters and Dischargers within the Chesapeake Bay Watershed* requires discharges with design flows of  $\geq 0.04$  mgd to treat for TN and TP to either BNR levels (TN = 8 mg/L; TP = 1.0 mg/L) or SOA levels (TN = 3.0 mg/L and TP = 0.3 mg/L).
  - 9 VAC 25-720 – *Water Quality Management Plan Regulation* sets forth TN and TP maximum wasteload allocations for facilities with design flows of  $\geq 0.5$  mgd limiting the mass loading from these discharges. The Water Quality Management Planning Regulation provides the following nutrient WLAs for this facility in Section C: 20,101 lbs/yr for total nitrogen and 1,206 lbs/yr for total phosphorus.
  - 9 VAC 25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia* was approved by the State Water Control Board on September 6, 2006 and became effective January 1, 2007. This regulation specifies and controls the nitrogen and phosphorus loadings from facilities and specifies facilities that must register under the general permit. Nutrient loadings for those facilities registered under the general permit as well as compliance schedules and other permit requirements, shall be authorized, monitored, limited, and otherwise regulated under the general permit and not this individual permit.
- 9 VAC 25-40-70, *Regulation for Nutrient Enriched Waters and Dischargers within the Chesapeake Bay Watershed*, states that the board shall include technology-based effluent concentration limitations in the individual permit for any facility that has installed technology for the control of nitrogen and phosphorus. 9 VAC 25-40-70 also states that the limitations shall be based upon the technology installed by the facility and shall be expressed as annual average concentrations.

On September 1, 1995, plans and specifications for upgrading the Quantico Mainside WWTP were approved by the Virginia Department of Health. This approval references a phosphorus effluent limit of 0.18 mg/L and states that provisions have been made to facilitate future compliance with a year-round TN limit of approximately 8.0 mg/L. Therefore, a concentration limit of 8.0 mg/L TN annual average shall be placed into the individual permit based upon 9 VAC 25-40-70. Monthly and year to date calculations for Total Nitrogen are also included in this individual permit. Loading limits will be governed by the general permit mentioned above.

e) Effluent Limitations and Monitoring Summary

The effluent limits are presented in the table that follows. Limits were established for flow, pH, cBOD<sub>5</sub>, TSS, enterococci, DO, total phosphorus, total nitrogen, ammonia, and TRC.

- 1) cBOD<sub>5</sub>, TSS, total phosphorus, and ammonia limits are based on the Policy for Potomac River Embayments (9 VAC 25-415-10 et seq.).
- 2) The limits for pH and enterococci are based on the Maryland Water Quality Criteria (Title 26, Subtitle 08 of the Code of Maryland Regulations).
- 3) The limits for TRC are based on Virginia Water Quality Standards (9 VAC 25-260-170) and the Maryland Water Quality Criteria (Title 26, Subtitle 08 of the Code of Maryland Regulations).
- 4) The limits for DO are based on best professional judgment supported by the demonstrated capability of the treatment plant. For other major plants regulated by the Policy for the Potomac River Embayments, this value came from the 1988 modeling by Northern Virginia Planning District Commission (NVPDC). Although the Quantico Mainside WWTP was not included within these studies, it is not expected that the 2.2 mgd flow will deplete the DO concentration within the 399-mgd Potomac River.
- 5) The limits for total nitrogen are based on the *Water Quality Management Plan Regulation* (9 VAC 25-40-70).

The mass loading expressed in kg/d for cBOD<sub>5</sub> and TSS monthly and weekly averages was calculated by multiplying the concentration values expressed as mg/L with the flow values expressed as mgd and a conversion factor of 3.785.

The mass loading expressed in lb/d for Total Phosphorus monthly and weekly averages was calculated by multiplying the concentration values expressed as mg/L with the flow values expressed as mgd and a conversion factor of 8.3438.

Sample Type and Frequency are in accordance with the recommendations in the VPDES Permit Manual.

**17. Antibacksliding:**

All limits in this permit are at least as stringent as those previously established. Backsliding does not apply to this reissuance.

**Effluent Limitations/Monitoring Requirements:**

Design flow is 2.2 mgd.

Effective Dates: During the period beginning with the permit's effective date and lasting until the expiration date.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		<u>Monthly Average</u>		<u>Weekly Average</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Frequency</u> <u>Sample Type</u>
Flow (mgd)	NA	NL		NA	NA	NL	Continuous TIRE
pH	1	NA		NA	6.5 S.U.	8.5 S.U.	1/D Grab
cBOD <sub>5</sub>	3	5 mg/L	42 kg/day	8 mg/L	67 kg/day	NA	NA 1/D 24H-C
Total Suspended Solids	3	6.0 mg/L	50 kg/day	9.0 mg/L	75 kg/day	NA	NA 1/D 24H-C
DO	2, 4	NA		NA	6.0 mg/L	NA	1/D Grab
Total Kjeldahl Nitrogen (TKN)	2, 5	NL		NL	NA	NA	1/W 24H-C
Ammonia, as N (Apr-Oct)	3	1.0 mg/L	83 kg/day	1.5 mg/L	125 kg/day	NA	NA 1/D 24H-C
Enterococci (Geometric Mean)	1	33 n/100 mls		NA	NA	NA	1/D Grab
Total Residual Chlorine	1, 2	0.094 mg/L		0.113 mg/L	NA	NA	1/D Grab
Nitrate+Nitrite, as N	5	NL mg/L		NA	NA	NA	1/W 24H-C
Total Nitrogen <sup>a</sup>	2, 5	NL mg/L		NA	NA	NA	1/W Calculated
Total Nitrogen – Year to Date <sup>b</sup>	2, 5	NL mg/L		NA	NA	NA	1/M Calculated
Total Nitrogen - Calendar Year <sup>b</sup>	2, 5	8.0 mg/L		NA	NA	NA	1/Y Calculated
Total Phosphorus	3	0.18 mg/L	3.3 lb/d	0.27 mg/L	5.0 lb/d	NA	NA 1/D 24H-C
Chronic Toxicity – <i>C. dubia</i> (TU <sub>c</sub> )	NA	NA		NA	NA	NL	1/Y 24H-C
Chronic Toxicity – <i>P. promelas</i> (TU <sub>c</sub> )	NA	NA		NA	NA	NL	1/Y 24H-C

The basis for the limitations codes are:

- |   |  |                        |
|---|--|------------------------|
| 1. MD Water Quality Criteria  | mgd = Million gallons per day                          | 1/D = Once every day.  |
| 2. VA Water Quality Standards   | NA = Not applicable                                    | 1/W = Once every week. |
| 3. Policy for the Potomac River Embayments (9 VAC 25-425-10 et. seq.) | NL= No limit   | 1/M= Once every month. |
| 4. Best Professional Judgment   | TIRE = Totalizing, indicating and recording equipment. | 1/Y = Once every year. |
| 5. 9 VAC 25-40-70 (Water Quality Mgmt Plan)                           | S.U. = Standard unit                                   |                        |

**24H-C** = A flow proportional composite sample collected manually or automatically and discretely or continuously for the entire discharge of the monitored 24-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of 24 aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum 24 grab samples obtained at hourly or smaller intervals may be collected. Where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by =10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

a. Total Nitrogen = Sum of TKN plus Nitrate+Nitrite

b. See Part 1.B.4.of the permit for nutrient reporting calculations.

**18. Other Permit Requirements :**

- a) Part I.B. of the permit contains quantification levels and compliance reporting instructions.  
9 VAC 25-31-190.L.4.c. requires an arithmetic mean for measurement averaging and 9 VAC 25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Specific analytical methodologies for toxics are listed in this permit section as well as quantification levels (QLs) necessary to demonstrate compliance with applicable permit limitations or for use in future evaluations to determine if the pollutant has reasonable potential to cause or contribute to a violation. Required averaging methodologies are also specified.

The calculations for the Nitrogen and Phosphorus parameters shall be in accordance with the calculations set forth in 9 VAC 25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia*. §62.1-44.19:13 of the Code of Virginia defines how annual nutrient loads are to be calculated; this is carried forward in 9 VAC 25-820-70. As annual concentrations (as opposed to loads) are limited in the individual permit, these reporting calculations are intended to reconcile the reporting calculations between the permit programs, as the permittee is collecting a single set of samples for the purpose of ascertaining compliance with two permits.

- b) Permit Section Part I.C., details the requirements for Toxics Management Program.  
The VPDES Permit Regulation at 9 VAC 25-31-210 requires monitoring and 9 VAC 25-31-220.I, requires limitations in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act. A TMP is imposed for municipal facilities with a design rate >1.0 mgd, with an approved pretreatment program or required to develop a pretreatment program, or those determined by the Board based on effluent variability, compliance history, instream waste concentration, and receiving stream characteristics.

The Quantico Mainside WWTP is required to conduct TMP testing because it is a major municipal permit with the potential to cause toxicity in the receiving stream. During the previous permit cycle, the permittee conducted five annual chronic tests using both *Ceriodaphnia dubia* and *Pimephales promelas*. All TMP testing conducted from August 2003 to April 2007 using Quantico Mainside effluent indicated an LC<sub>50</sub> greater than 100% effluent and a NOEC less than the IWC. Since the testing has passed all decision criteria, the permittee will be required to continue monitoring chronic toxicity annually during the term of the permit using *Ceriodaphnia dubia* and *Pimephales promelas*. If the effluent is found to be toxic, a toxicity reduction evaluation (TRE) will be required and a whole effluent toxicity (WET) limit will be imposed unless the TRE has successfully identified the chemical(s) causing the toxicity. In that case, a chemical specific limit will be used in lieu of the WET limit. Sampling and reporting procedures are outlined in Part I of the permit.

The discharge area for Outfall 001 has tidal influence. As stated previously in this fact sheet, a 50:1 dilution is used in this permit to determine the WLAc for toxic parameters; it will be maintained here for consistency and will be used as the NOEC criteria for toxicity monitoring (**Attachment 14**).

- c) Permit Section Part I.D., details the requirements for the regulation of users.  
The VPDES Permit Regulation at 9 VAC 25-31-280.B.9 requires that the Board provide an explanation on the regulation of users (i.e., industrial, indirect dischargers) to treatment works not owned by a state or a municipality.

When the Quantico Mainside WWTP permit was reissued on April 2, 2003, the facility was required to submit an Industrial User Survey to DEQ-NRO within one year of the date of permit reissuance. A survey was received by DEQ-NRO on April 1, 2004 (**Attachment 15** details the industrial dischargers).

To determine if there have been industrial user changes, Quantico Mainside WWTP will be required to submit an updated Industrial User Survey to DEQ-NRO within one year of the date of this permit reissuance.

**19. Other Special Conditions:**

- a) 95% Capacity Reopener. The VPDES Permit Regulation at 9 VAC 25-31-200.B.2 requires all POTWs and PVOTWs develop and submit a plan of action to DEQ when the monthly average influent flow to their sewage treatment plant reaches 95% or more of the design capacity authorized in the permit for each month of any three consecutive month period.
- b) Indirect Dischargers. Per the VPDES Permit Regulation at 9 VAC 25-31-280.B.9, this sewage treatment plant shall submit an Industrial User Survey. This report will be due one year from the effective date of the permit.
- c) O&M Manual Requirement. Required by Code of Virginia §62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790 and VPDES Permit Regulation, 9 VAC 25-31-190.E. The permittee shall submit for approval an Operations and Maintenance (O&M) Manual or a statement confirming the accuracy and completeness of the current O&M Manual to the Department of Environmental Quality, Northern Regional Office (DEQ-NRO) by December 31, 2008. Future changes to the facility must be addressed by the submittal of a revised O&M Manual within 90 days of the changes. Non-compliance with the O&M Manual shall be deemed a violation of the permit.
- d) CTC, CTO Requirement. The Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790 requires that all treatment works treating wastewater obtain a Certificate to Construct prior to commencing construction and to obtain a Certificate to Operate prior to commencing operation of the treatment works.
- e) Licensed Operator Requirement. The Code of Virginia at §54.1-2300 et seq., the VPDES Permit Regulation at 9 VAC 25-31-200 D, and Rules and Regulations for Waterworks and Wastewater Works Operators (18 VAC 160-20-10 et seq.) requires licensure of operators. This facility requires a Class I operator.
- f) Reliability Class. The Sewage Collection and Treatment Regulation at 9 VAC 25-790 requires sewerage works achieve a certain level of reliability in order to protect water quality and public health consequences in the event of component or system failure. The facility is required to meet a reliability Class of I.
- g) Sludge Reopener. The VPDES Permit Regulation at 9 VAC 25-31-200.C.4 requires all permits issued to treatment works treating domestic sewage (including sludge-only facilities) include a reopener clause allowing incorporation of any applicable standard for sewage sludge use or disposal promulgated under Section 405(d) of the Clean Water Act. The facility includes a sewage treatment works.
- h) Sludge Use and Disposal. The VPDES Permit Regulation at 9 VAC 25-31-100.P, 220.B.2, and 420-720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information regarding their sludge use and disposal practices and to meet specified standards for sludge use and disposal. Technical requirements may be derived from the Biosolids Use Regulations, 12 VAC 5-585-10 et seq. The facility includes a treatment works treating domestic sewage.
- i) E3/E4. 9 VAC 25-40-70 B authorizes DEQ to approve an alternate compliance method to the technology-based effluent concentration limitations as required by subsection A of this section. Such alternate compliance method shall be incorporated into the permit of an Exemplary Environmental Enterprise (E3) facility or an Extraordinary Environmental Enterprise (E4) facility to allow the suspension of applicable technology-based effluent concentration limitations during the period the E3 or E4 facility has a fully implemented environmental management system that includes operation of installed nutrient removal technologies at the treatment efficiency levels for which they were designed.
- j) Nutrient Reopener. 9 VAC 25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade. 9 VAC 25-31-390 A authorizes DEQ to modify VPDES permits to promulgate amended water quality standards.

- k) Alternation of the Outfall: The permittee shall submit a revised Mainside Sewage Treatment Plant Mixing Zone Study to DEQ-NRO within 90 days of either moving the location of Outfall 001 or significantly altering the discharge point.
- l) PCB Monitoring. This special condition shall require the permittee to monitor and report PCB concentrations in dry weather and wet weather effluent samples. The results from this monitoring shall be used to implement the PCB TMDL that was developed for the Potomac River and approved by EPA in October 2007. This facility was given a WLA in the TMDL.

**20. Permit Section Part II:**

Part II of the permit contains standard conditions that appear in all VPDES Permits. In general, these standard conditions address the responsibilities of the permittee, reporting requirements, testing procedures and records retention.

**21. Changes to the Permit from the Previously Issued Permit:**

- a) Special Conditions:
  - 1) The O&M Manual Requirement and the CTC, CTO Requirement have been separated into two special conditions.
  - 2) The Water Quality Criteria Monitoring and Reopener Special Conditions have been removed.
  - 3) An E3/E4 Special Condition has been added.
  - 4) A Nutrient Reopener Special Condition has been added.
  - 5) A Special Condition regarding moving or alternating the outfall has been added.
  - 6) A Special Condition requiring monitoring for PCBs has been included.
- b) Monitoring and Effluent Limitations:
  - 1) Annual monitoring for zinc has been removed because all data collected shows that limits are not needed.
  - 2) The limits for pH have been changed from a minimum of 6.0 S.U. and a maximum of 9.0 S.U. to a minimum of 6.5 S.U. and a maximum of 8.5 S.U. to ensure compliance with the Maryland Water Quality Criteria.
  - 3) The monthly average for enterococci has been changed from 35 n/100 mls to 33 n/100 mls to ensure compliance with the Maryland Water Quality Criteria.
  - 4) Loading for TP is now in lb/day.
  - 5) The TN reporting has been updated.
  - 6) Loading limits for ammonia have been added for the April through October period.
- c) Other:
  - 1) The waterbody ID has been changed from VAN-A26R to VAN-A26E (see **Attachment 7**).

**22. Variances/Alternate Limits or Conditions:**

- a) Waivers from application testing requirements (Form 2A, Part D, One Sampling Event)
- b) A 10:1 dilution was used to calculate WLAs for toxics instead of a 2:1 dilution. This is based on a mixing zone study conducted in October 2000 (see **Attachment 13**).

**23. Public Notice Information:**

First Public Notice Date: 8/16/08

Second Public Notice Date: 8/22/08

Public Notice Information is required by 9 VAC 25-31-280 B. All pertinent information is on file and may be inspected, and copied by contacting the: DEQ Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193,

Telephone No. (703) 583-3837, atwesternik@deq.virginia.gov. See **Attachment 16** for a copy of the public notice document.

Persons may comment in writing or by email to the DEQ on the proposed permit action, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing if public response is significant. Requests for public hearings shall state the reason why a hearing is requested, the nature of the issues proposed to be raised in the public hearing and a brief explanation of how the requester's interests would be directly and adversely affected by the proposed permit action. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given.

**24. 303 (d) Listed Stream Segments and Total Max. Daily Loads (TMDL):**

The Quantico Mainside WWTP discharges to an unnamed tributary of Quantico Bight, which flows to the Potomac River. The freshwater tidal Potomac River has a fish consumption advisory due to the presence of PCBs in the waterway. A TMDL for PCBs has been prepared for the Potomac River and was submitted to EPA on September 30, 2007. The Quantico Mainside WWTP shall collect two wet weather samples and two dry weather samples during the term of this permit.

**25. Additional Comments:**

a) Development of the Policy for the Potomac River Embayments (9 VAC 25-415-10):

The State Water Control Board adopted the Potomac Embayment Standards (PES) in 1971 to address serious nutrient enrichment problems evident in the Virginia embayments and Potomac River at the time. These standards applied to sewage treatment plants discharging into Potomac River embayments in Virginia and for expansions of existing plants discharging into the non-tidal tributaries of these embayments. The standards were actually effluent limitations for BOD, unoxidized nitrogen, total phosphorus, and total nitrogen:

<u>Parameter</u>	<u>PES Standard (monthly average)</u>
BOD <sub>5</sub>	3 mg/L
Unoxidized Nitrogen	1 mg/L (Apr – Oct)
Total Phosphorus	0.2 mg/L
Total Nitrogen	1 mg/L (when technology is available)

Based upon these standards, several hundred million dollars were spent during the 1970s and 1980s upgrading major treatment plants in the City of Alexandria and the Counties of Arlington, Fairfax, Prince William, and Stafford. Today, these localities operate advanced wastewater treatment plants that have contributed a great deal to the dramatic improvement in the water quality of the upper Potomac estuary. However, of all the PES limits, the facilities could only reliably meet the phosphorus effluent limitation.

Before the planned upgrades at these facilities were completed and the water quality improved, questions arose over the high capital and operating costs that would result from meeting all of the requirements contained in the PES. Questions also arose regarding the fact that the PES were blanket effluent limitations that applied equally to different bodies of water. Therefore, in 1978, the State Water Control Board committed to reevaluate the PES. In 1984, a major milestone was reached when the Virginia Institute of Marine Science (VIMS) completed state-of-the-art models for each of the embayments. The Board then selected the Northern Virginia Planning District Commission (NVPDC) to conduct wasteload allocation studies of the Virginia embayments using the VIMS models. In 1988, these studies were completed and effluent limits that would protect the embayments and the mainstem of the Potomac River were developed for each major facility. Neither the Quantico Bight or the Mainside STP was included in the NVPDC study. See **Attachment 17** for the executive summaries.

Since the PES had not been amended or repealed, VPDES permits had included the PES as effluent limits. Since the plants could not meet all of the requirements of the PES, the plant owners operated under consent orders or consent decrees with operating effluent limits for the treatment plants that were agreed upon by the owners and

the Board.

In 1982, staff evaluated the applicability of the PES to the Quantico Bight and determined that the PES were not applicable to the Bight or Quantico Mainside STP. The Board ratified Letter Ballot 4948 at its September 1982 meeting, directing the staff to remove the PES from Quantico Bight. This is a possible reason why the Quantico Bight and the Mainside STP were not included in the VIMS models and NVPDC studies.

It was discovered in 1986, during the VPDES permit preparation for the Mainside STP, that although the Board had previously directed the staff to remove the PES designation from the Quantico Bight, the Water Quality Standards were never modified to removed the PES from the Quantico Bight. Consequently, the Mainside STP permit was reissued, containing PES standards as effluent limits. A Special Order was also issued to the U.S. Marine Corps for the Mainside STP on June 18, 1986, stating that the Board recognized that the effluent limits contained in Appendix A of the Order are interim limits, and that once the Board removed the PES from Quantico Bight, the Mainside STP permit would be amended to include new final effluent limitations. (A copy of this Special Order is included in **Attachment 18**). The public participatory process to receive data, views and arguments concerning the proposal to amend the Water Quality Standards to establish the Quantico Bight and its tidal tributaries as a separate section, Section 5C, in the Potomac River Subbasin, establishing the requirements of Class II waters with no special standards for Quantico Bight and its tidal tributaries was restarted, and a public hearing was held August 11, 1986, in the Prince William County Complex (Woodbridge, VA) (**Attachment 19**). However, no final Board action completed this amendment, and the Bight again remained subject to the PES.

In 1991 and 1992, several Northern Virginia jurisdictions with embayment treatment plants submitted a petition to the Board requesting that the Board address the results of the VIMS/NVPDC studies. Their petition requested revised effluent limitations and a defined modeling process for determining effluent limitations.

The recommendations in the petition were designed to protect the extra sensitive nature of the embayments along with the Potomac River, which has become a popular recreational resource during recent years. The petition included requirements more stringent than would be applied using the results of the modeling/allocation work conducted in the 1980s. With the inherent uncertainty of modeling, the petitioners questioned whether the results of modeling would provide sufficient protection for the embayments. By this petition, the local governments asked for continued special protection for the embayments based upon a management approach that uses stringent effluent limits. They believe this approach has proven successful over the past two decades. In addition, the petition included a modeling process that will be used to determine if more stringent limits are needed in the future due to increased wastewater discharges.

The State Water Control Board adopted the petition, with revisions, as a regulation on September 12, 1996 (**Attachment 20**). The regulation is entitled *Policy for the Potomac River Embayments* (9 VAC 25-415-10 et seq.). On the same date, the Board repealed the old PES. The new regulation became effective on April 3, 1997, and contains the following effluent limits, which became effective on April 3, 2002:

<u>Parameter</u>	<u>PES Standard (monthly average)</u>
BOD <sub>5</sub>	5 mg/L
TSS	6 mg/L
Total Phosphorus	0.18 mg/L
Ammonia as Nitrogen	1 mg/L (Apr - Oct)

9 VAC 25-415-50 Water Quality Monitoring. The Policy says “that water quality models may be required to predict the effects of wastewater discharges on the water quality of the receiving waterbody, the embayment, and the Potomac River. The purpose of the modeling shall be to determine if more stringent limits than those required by 9 VAC 25-415-40 (the Policy’s effluent limitations) are required to meet water quality standards.”

- b) BOD Removal Rate: With the current cBOD<sub>5</sub> limits of 5 mg/L and 8 mg/L (monthly and weekly average), the BOD removal rate will comply with 40 CFR Part 133 (at least 85% removal).
- c) Enforcement History: Quantico Mainside WWTP was referred to enforcement on June 17, 2002 for chronic overflows of untreated sewage from the wastewater treatment plant’s collection system. A Consent Order was

executed on July 1, 2003 that required Quantico Mainside WWTP to implement interim measures to prevent the chronic overflows from the collection system until the lines were replaced or renovated. This Consent Order was closed in February 2006 because Quantico Mainside WWTP complied with all the terms of the Consent Order.

Quantico Mainside WWTP was referred to enforcement again on April 19, 2004 for failure to meet Reliability Class I requirements. A Plan of Action and Milestones was finalized on March 25, 2005 to address Class I Reliability and other regulatory deficiencies at the wastewater treatment plant. Items in the Plan of Action and Milestones were adequately address and DEQ-NRO enforcement staff dereferred the case on March 10, 2006.

- d) Public Comment: No comments were received during the public notice.
- e) EPA Checklist: The checklist can be found in **Attachment 21**.

## **Attachments**

1. Flow Frequency Determination
2. Facility Schematic/Diagram
3. USGS Topographic Map 194D (Quantico Quad)
4. Summary of Material Storage
5. Site Inspection Memorandum Dated October 19, 2007
6. Map Showing MD DNR Monitoring Station and Outfall 001
7. Planning Statement Dated August 30, 2007
8. MD Water Quality Criteria
9. Dissolved Oxygen Water Quality Criteria
10. Freshwater Water Quality Criteria and Wasteload Allocations
11. Summary of Effluent Data
12. Excerpt from the October 8, 2000 Mixing Zone Study for Quantico Bight
13. Ammonia, TRC, and Metals Limit Calculations
14. TMP Chronic Endpoint Determination
15. List of Industrial Dischargers
16. Public Notice
17. Executive Summaries of Wasteload Allocation Studies
18. Special Order for the Quantico Mainside WWTP dated June 18, 1986
19. Information Concerning the August 11, 1986 Public Hearing
20. Policy for the Potomac River Embayment (9 VAC 25-415-10 et seq.)
21. EPA Checklist

# MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION  
Water Quality Assessments and Planning  
629 E. Main Street P.O. Box 10009 Richmond, Virginia 23240

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**SUBJECT:** Flow Frequency Determination  
USMC Quantico Mainside WWTP - #VA0028363

**TO:** Anna Westernik, NRO

**FROM:** Paul E. Herman, P.E., WQAP

**DATE:** October 21, 2002

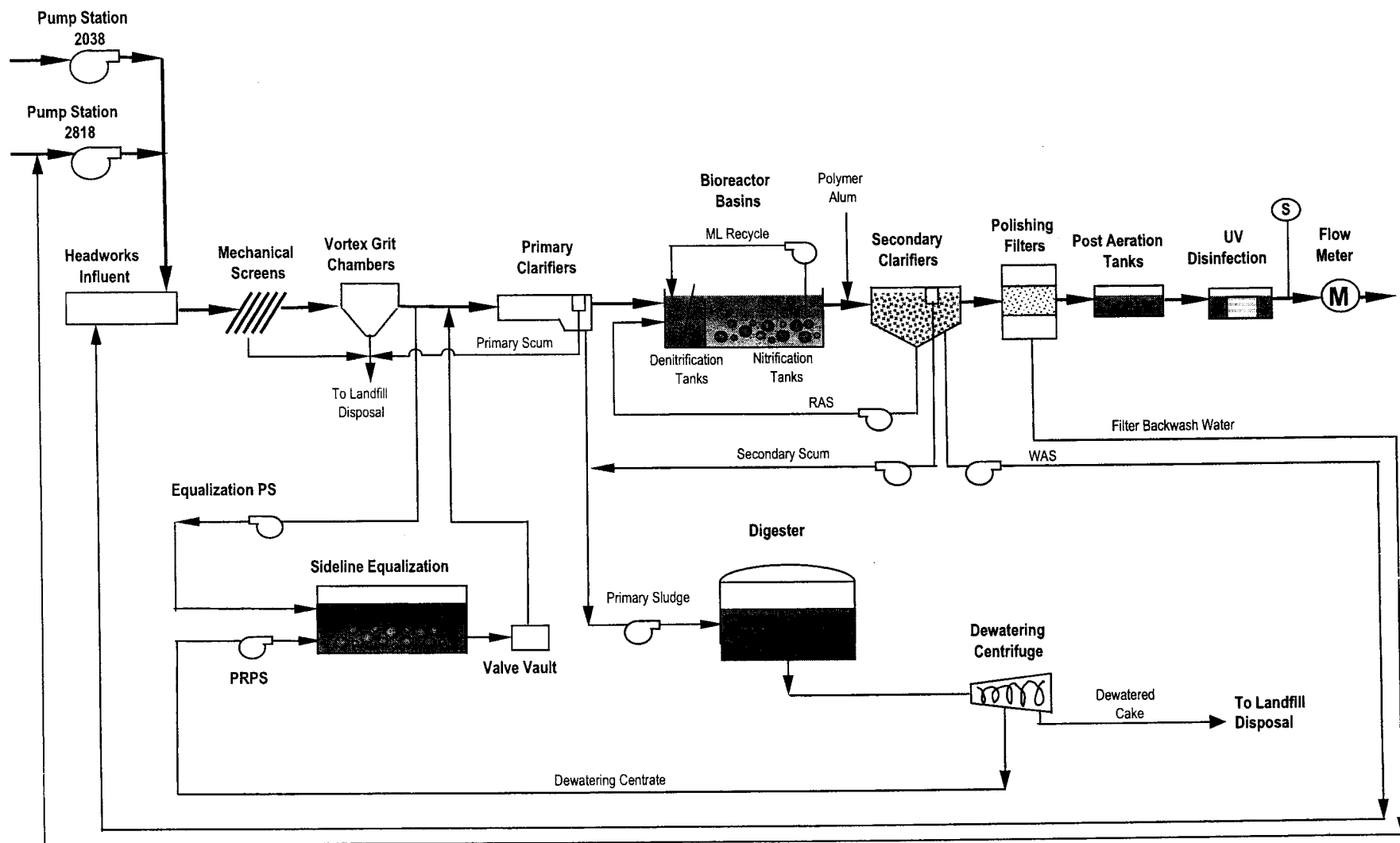
**COPIES:** File

The USMC Quantico Mainside WWTP discharges to an embayment on the Potomac River near Quantico, VA. Flow frequencies are required at this site for use by the permit writer in developing effluent limitations for the VPDES permit.

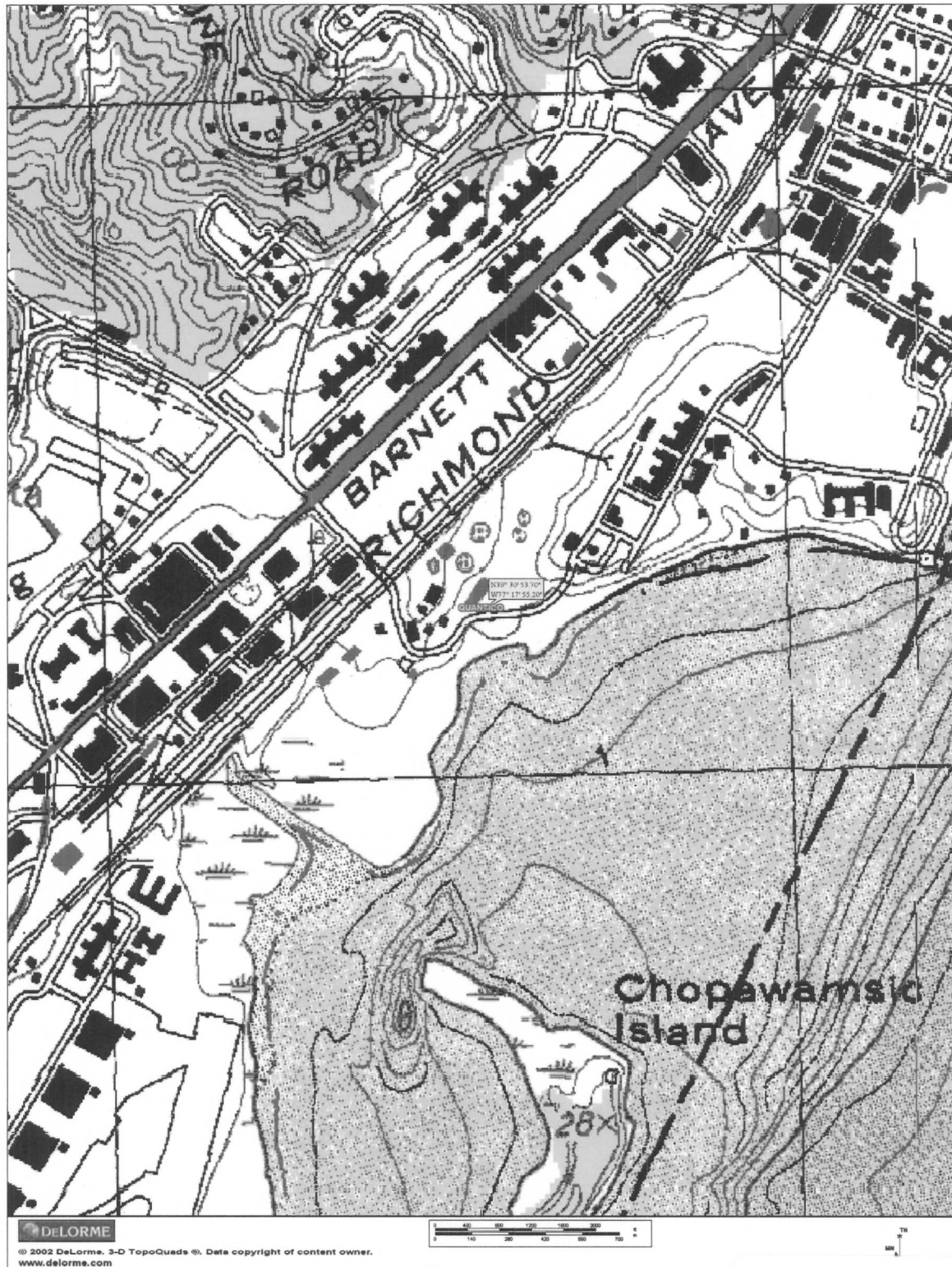
The values at the discharge point were determined by inspection of the USGS Quantico Quadrangle topographical map which shows the receiving waters to be an embayment on the mainstem of the tidal Potomac River. As indicated on the topo map, the embayment is not fed by any perennial streams other than the tidal Potomac River. The flow frequencies for tidal streams are not determinable. As there is no perennial freshwater inflow to the embayment, flow frequencies have not been determined.

If you have any questions concerning this analysis, please let me know.

# ATTACHMENT C



## Outfall 001 of the Quantico Mainside WWTP



IMMEDIATE SPILL RESPONSE EMERGENCY ACTION PLAN		
Mainside Sewage Treatment Plant Hazardous Substance Inventory (Bldg # 660)		
MATERIAL	CONTAINER	LOCATION
Polymer	55-gallon drums	Building 660
	200-gallon	Building 659
Gasoline	5-gallon cans	Maintenance shed
Lubricating oil	55-gallon drums	Building 661
Hydraulic fluid	5 gallon Cans	Building 661
Mixed fuel	5 gallon Cans	Warehouse
Engine oil	55 gallon drums	Maintenance shed
#2 Fuel Oil	1,000-gallon aboveground storage tank number 660	Northeast of Building 660
Sodium hydroxide (Caustic Soda)	3,128 gallons vault	Northwest of Building 660
Aluminum sulfate	4,369 gallons vault	Northwest of Building 660
Caustic soda	6,000-gallon aboveground storage tank	Northwest of Flow Equalization Basin
Caustic soda and alum	1100 gallon Day tank	Building 660
Alum	Two 1600 gallon tanks	Building 660
Polymer	800 gallon Mixing tank	Building 660

All bulk storage tanks are located in diked secondary containment units. Any spills that occur will be returned to the head of the plant.

Fuel oil is stored in a double-walled tank.

Small containers and bags are stored indoors.

October 19, 2007  
**MEMORANDUM**

To: File

From: Anna Westernnik, Water Permit Writer

Subject: October 16, 2007 Inspection of USMC Quantico Mainside STP  
(VA0028363)

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The purpose of this memo is to detail the October 16, 2007 inspection of the USMC Quantico Mainside STP. This inspection was conducted to review the operation of the facility prior to reissuing the permit. Anna Westernnik and Beth Biller of DEQ and Dave Crosely, Wastewater Plant Supervisor, Mike Herlan, Nikki Bennett, and Tom Sperlazza of USMC Quantico were present during the inspection.

Influent flow enters the plant through the headworks, which consists of a grit removal system and two barscreens. If the flow is excessive, overflow will enter an equalization basin located near the headworks. A mechanical barscreen is normally used, however, the manual barscreen is maintained as a backup. Grit and barscreen debris are conveyed by a belt to a dumpster and disposed of in a landfill.

Effluent from the headworks enters two primary treatment units that operate in parallel. Caustic soda is added at this location for pH adjustment. Approximately 90% of the sludge from these units is wasted to the digester. The effluent exiting the primary treatment units combines in a wetwell located before the denitrification basin with mixed liquors suspended solids (MLSS) from the aeration basin and returned activated sludge (RAS) from the clarifiers. Wetwell effluent enters the denitrification basin where caustic soda is added for pH adjustment. From the denitrification basin, effluent enters the nitrification basins. Four nitrification basins are present. Alum is added in the nitrification basins for phosphorus control.

Effluent leaving the nitrification basins flows to secondary clarifiers. Three secondary clarifiers are present; however, only two of the clarifiers are normally online. Polymer is added at the clarifiers to aid in settling. RAS is sent from the clarifiers to the denitrification basin; WAS and scum are sent to the primary treatment units located at the headworks. This treatment plant has four RAS pumps, two WAS pumps, and two scum pumps.

The effluent is treated by two polishing filters after leaving the clarifiers. This filtering is effective in the removal of suspended solids and phosphorus and increases the efficiency of UV disinfection. Filter media consists of three grades of sand and anthracite. The polishing filters are backwashed when the pressure reaches approximately 100 psi. Flow from the filters enters the old chlorine contact tank where it is aerated and then the UV light treatment train. Backwash from the filters is pumped to the primary treatment units at the head of the plant.

Disinfection is via UV light. Two meters located after UV disinfection are used so that adjustment could be made for the tide when flow was measured.

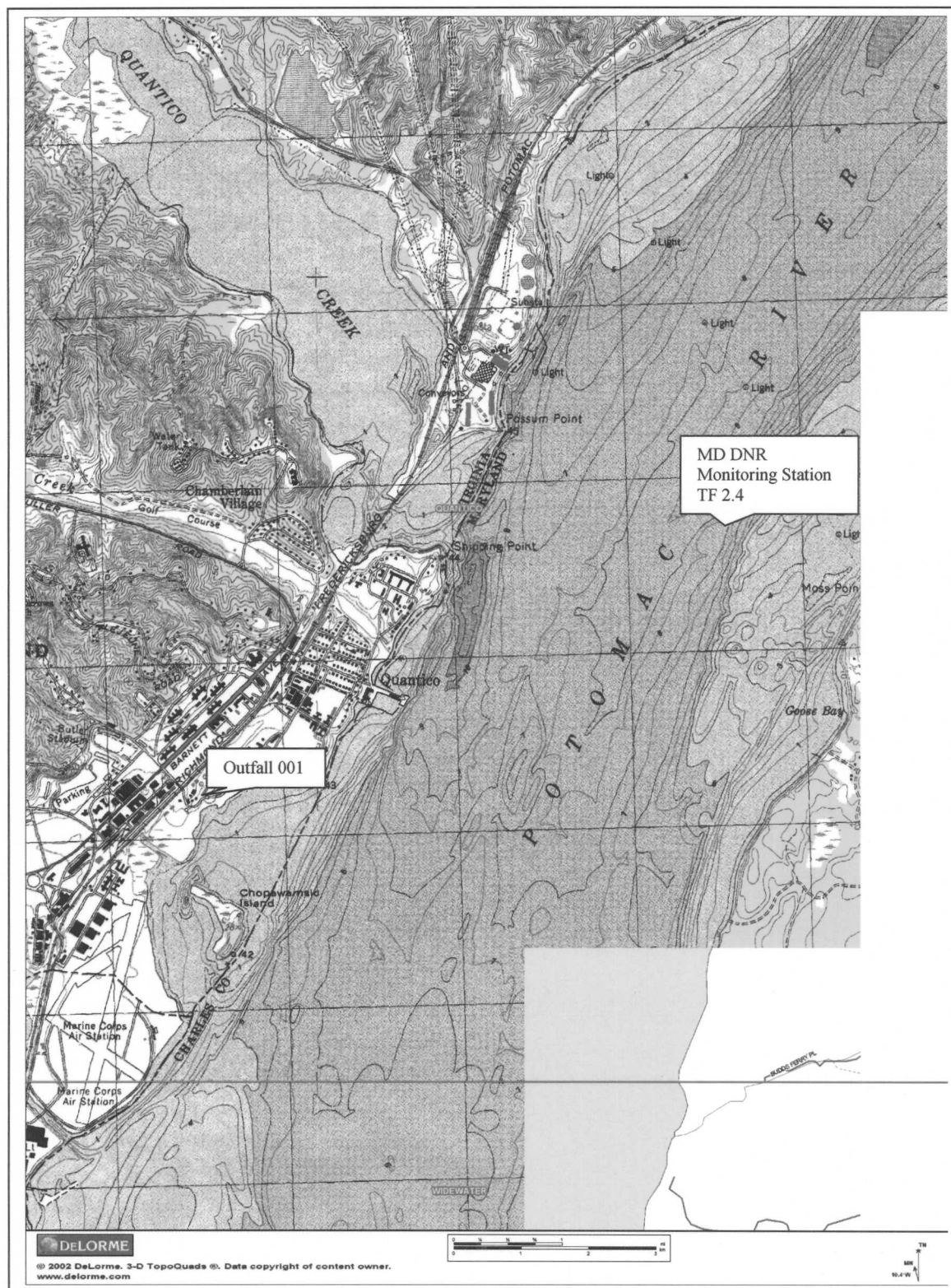
The outfall discharges into an artificial slow-flowing channelized area near a road. There is minimal algal growth in this area, evidence of healthy emergent aquatic vegetation, and fish. Flow travels through a culvert under the road into an unnamed tributary of the Potomac River, Quantico Bight.

Waste sludge generated by the facility is sent to a floating cover anaerobic digester. Two working digesters are present. However, only one digester is used—the second is a backup. Sludge is continuously routed from the digester, heated, and returned to the digester. External heat transfer via 122 °F steam is used to constantly heat the sludge within the digester. Two return pumps that alternate operation are present to transport heated sludge back to the digester. Each digester has three large bubble tube mixers. Appropriate gas balancing uses compressed digester gas to mix the sludge; excess gas is burned off.

Digested sludge is dewatered by three centrifuges that alternate operation every one to two weeks. Polymer is added to the centrifuges to thicken the sludge and thus, increase percent capture.

Thickened sludge is transported from the site via roll off trucks and disposed of in the King George County Landfill.

# Outfall 001 of the Quantico Mainside WWTP in Relation to Maryland DNR Monitoring Station TF 2.4



To: Rob Swanson  
From: Anna Westernik

Date: August 30, 2007  
Subject: Planning Statement for the Quantico Mainside WWTP (VA0028363)

Discharge Type: Municipal  
Discharge Flow: 2.2 MGD

Watersheds; VA95: VAN-A26E  
NWBD: PL54

Receiving Stream: UT to Quantico Bight of the Potomac River  
Latitude / Longitude: 38° 30' 53.7"  
77° 17' 55.2"

1. Is there monitoring data for the receiving stream? No.
  - If yes, please attach latest summary. NA
  - If no, where is the nearest downstream monitoring station.  
There are no downstream monitoring stations, as the Potomac River is monitored and assessed by the State of Maryland.
2. Is the receiving stream on the current 303(d) list? No.
  - If yes, what is the impairment? NA
  - Has the TMDL been prepared? NA
  - If yes, what is the WLA for the discharge? NA
  - If no, what is the schedule for the TMDL? NA
3. If the answer to (2) above is no, is there a downstream 303(d) listed impairment? Yes.
  - If yes, what is the impairment?  
Based on the 2006 Integrated Report, there are two impairments listed for Virginia's portion of the Potomac River embayment. **First, there is a fish consumption advisory;**

The fish consumption use is categorized as impaired due to a Virginia Department of Health, Division of Health Hazards Control, PCB fish consumption advisory. The advisory, dated 4/19/99 and modified 12/13/04, limits consumption of American eel, bullhead catfish, channel catfish less than eighteen inches long, largemouth bass, anadromous (coastal) striped bass, sunfish species, smallmouth bass, white catfish, white perch, gizzard shad, and yellow perch consumption to no more than two meals per month. The advisory also restricts the consumption of carp and channel catfish greater than eighteen inches long. The affected area includes the tidal portions of the following tributaries and embayments from the I-395 bridge (above the Woodrow Wilson Bridge) to the Potomac River Bridge at Route 301: Fourmile Run, Hunting Creek, Little Hunting Creek, Pohick Creek, Accotink Creek, Occoquan River, Neabsco Creek, Powell Creek, Quantico Creek, Chopawamsic Creek, Aquia Creek, and Potomac Creek.

**Second, there is a dissolved oxygen impairment based on data collected and modeled by the Chesapeake Bay Program.** The facility discharges into the oligohaline portion of the Potomac River (POTOH). An open water assessment of dissolved oxygen values during the summer season between 2002 and 2004 showed that the POTOH was not supporting. The POTOH was 2.29 percent above CFD.

- Has a TMDL been prepared?

A TMDL for PCBs has been prepared for the Potomac River and was recently submitted to EPA (September 30, 2007).

- Will the TMDL include the receiving stream?

The TMDL will not include the receiving stream, as it is not impaired and appears to be an artificial drainage ditch. However, the facility itself is included in the PCB TMDL.

- Is there a WLA for the discharge?

Yes, the facility was provided with a PCB WLA of 0.195 grams/year.

- What is the schedule for the TMDL?      See above.

4. Is there monitoring or other conditions that Planning/Assessment needs in the permit?

It is requested that the facility monitor for PCBs using test method 1668a, including a monitoring event in wet flow conditions. This fall, DEQ is developing guidance which outlines specifics on the methodology used for testing for PCBs at the outfall of a point source facility.

5. Could you please calculate the drainage area at the outfall?

The facility appears to discharge to a channel, which then discharges to the Potomac River. In light of these facts, I have corrected the watershed to read VAN-A26E, rather than VAN-A26R. Additionally, the drainage area is difficult to calculate, as the gradient is very low and the estuarine influences are great.

### .03-3 Water Quality Criteria Specific to Designated Uses.

A. Criteria for Use I Waters—Water Contact Recreation and Protection of Nontidal Warmwater Aquatic Life.

(1) Bacteriological.

(a) Table 1. Bacteria Indicator Criteria for Frequency of Use.

Steady State Geometric		Single Sample Maximum Allowable Density			
Mean Indicator Density		Frequent Full	Moderately Frequent	Occasional Full Body	Infrequent Full Body
		Body Contact Recreation (Upper 75% CL)	Body Contact Recreation (Upper 82% CL)	Body Contact Recreation (Upper 90% CL)	Body Contact Recreation (Upper 95% CL)
Indicator		All Areas			
Freshwater (Either apply)					
Enterococci	33	61	78	107	151
E. coli	126	235	298	410	576
Marine water					
Enterococci	35	104	158	275	500

CL = confidence level

All numbers are counts per 100 milliliters

(b) In freshwater for E. coli, the following formula is used to calculate the upper 75 percent confidence interval for single sample maximum allowable density:  $\text{antilog}[(\log 126) + 0.675 * \log(\text{SD})]$ .

(c) In freshwater for enterococci, the following formula is used to calculate the upper 75 percent confidence interval for single sample maximum allowable density:  $\text{antilog}[(\log 33) + 0.675 * \log(\text{SD})]$ , where  $\log(\text{SD})$  is the standard deviation of the log transformed E. coli or enterococci data. If the site data are insufficient to establish a log standard deviation, then 0.4 is used as the log standard deviation for both indicators. At the default log standard deviation, the values are 235 for E. coli and 61 for enterococci.

(d) In saltwater, for enterococci, the following formula is used to calculate the upper 75 percent confidence interval for single sample maximum allowable density:  $\text{antilog}[(\log 35) + 0.675 * \log(\text{SD})]$ , where  $\log(\text{SD})$  is the standard deviation of the log transformed enterococci data. If the site data are insufficient to establish a log standard deviation, then 0.7 is used as the log standard deviation. At the default log standard deviation, the value is 104.

(e) Confidence Level Factors.

(i) The factors in Table 2 are used in the formulas in this subsection to calculate the appropriate confidence limits when site-specific standard deviations are used.

(ii) Table 2.

Confidence Level	Factor
75%	0.675

82%	0.935
90%	1.280
95%	1.650

(f) Establishment of a Site-Specific Standard Deviation. A site-specific standard deviation for use in the formulas in this subsection shall be based on at least 30 samples, taken over not more than one recreational season, at base flows.

(g) When a sanitary survey and an epidemiological study approved by the Department disclose no significant health hazard, the criteria in Table 1 do not apply.

(2) Dissolved Oxygen. The dissolved oxygen concentration may not be less than 5 milligrams/liter at any time.

(3) Temperature.

(a) The maximum temperature outside the mixing zone determined in accordance with Regulation .05 of this chapter or COMAR 26.08.03.03 —.05 may not exceed 90°F (32°C) or the ambient temperature of the surface surface waters, whichever is greater.

(b) A thermal barrier that adversely affects aquatic life may not be established.

(c) Ambient temperature is the water temperature that is not impacted by a point source discharge.

(d) Ambient temperature shall be measured in areas of the stream representative of typical or average conditions of the stream segment in question.

(e) The Department may determine specific temperature measurement methods, times, and locations.

(4) pH. Normal pH values may not be less than 6.5 or greater than 8.5.

(5) Turbidity.

(a) Turbidity may not exceed levels detrimental to aquatic life.

(b) Turbidity in the surface water resulting from any discharge may not exceed 150 units at any time or 50 units as a monthly average. Units shall be measured in Nephelometer Turbidity Units.

(6) Color. Color in the surface water may not exceed 75 units as a monthly average. Units shall be measured in Platinum Cobalt Units.

(7) Toxic Substance Criteria. All toxic substance criteria to protect:

(a) Fresh water aquatic organisms apply in waters designated as fresh water in Regulation .03-1B;

(b) Estuarine or salt water aquatic organisms apply in waters designated as estuarine or salt waters as specified in Regulation .03-1B; and

(c) The wholesomeness of fish for human consumption apply in fresh, estuarine, and salt waters.

B. Criteria for Subcategory Use I-P Waters—Water Contact Recreation, Protection of Nontidal Warmwater Aquatic Life and Public Water Supply. The following criteria apply:

(1) The criteria for Use I waters in §A(1)—(5); and

(2) Toxic Substance Criteria. All toxic substance criteria:

(a) For protection of fresh water aquatic organisms apply; and

(b) To protect public water supplies and the wholesomeness of fish for human consumption apply.

C. Criteria for Use II Waters—Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting.

(1) Bacteriological Criteria. These criteria are the same as for Use I, criteria for protection of recreational use, except, in Shellfish Harvest Waters, the following criteria also apply. In Shellfish Harvest waters, there may not be any pathogenic or harmful organisms in sufficient quantities to constitute a public health hazard in the use of waters for shellfish harvesting. A public health hazard for the consumption of raw shellfish will be presumed:

(a) If the most probable number (MPN) of fecal coliform organisms exceeds a median concentration of 14 MPN per 100 milliliters;

(b) If more than 10 percent of samples taken exceed 43 MPN per 100 milliliters for a 5-tube decimal dilution test or 49 per 100 milliliters for a 3-tube decimal dilution test; or

(c) Except when a sanitary survey approved by the Department of the Environment discloses no significant health hazard, §C(1)(a) and (b) do not apply and a public health hazard from the consumption of shellfish will not be presumed.

(2) Classification of Use II Waters for Harvesting.

(a) Approved classification means that the median fecal coliform MPN of at least 30 water sample results taken over a 3-year period to incorporate inter-annual variability does not exceed 14 per 100 milliliters; and:

(i) In areas affected by point source discharges, not more than 10 percent of the samples exceed an MPN of 43 per 100 milliliters for a five tube decimal dilution test or 49 MPN per 100 milliliters for a three tube decimal dilution test; or

(ii) In other areas, the 90th percentile of water sample results does not exceed an MPN of 43 per 100 milliliters for a five tube decimal dilution test or 49 MPN per 100 milliliters for a three tube decimal dilution test.

(b) Conditionally approved classification means that the Department has determined that under certain conditions an area is restricted, but when not restricted, meets the conditions for the approved classification.

(c) Restricted classification means that the median fecal coliform MPN of at least 30 water sample results taken over a 3-year period does not exceed 88 per 100 milliliters or that the Department has determined that a public health hazard exists; and:

(i) In areas affected by point source discharges, not more than 10 percent of the samples exceed an MPN of 260 per 100 milliliters for a five tube decimal dilution test or 300 MPN per 100 milliliters for a three tube decimal dilution test; or

(ii) In other areas, the 90th percentile of water sample results does not exceed an MPN of 260 per 100 milliliters for a five tube decimal dilution test or 300 MPN per 100 milliliter for a three tube decimal dilution test.

(d) Prohibited classification means that the fecal coliform values exceed those required for the restricted classification or is an area designated by the Department as a closed safety zone adjacent to a sewage treatment facility outfall or is an area closed due to a known pollution source.

(3) Temperature—same as Use I waters.

(4) pH—same as Use I waters.

(5) Turbidity—same as Use I waters.

(6) Color—same as Use I waters.

(7) Toxic Substance Criteria. All toxic substance criteria to protect:

(a) Estuarine or salt water aquatic organisms apply in accordance with the requirements of Regulation .03-1B; and

(b) The wholesomeness of fish for human consumption apply.

(8) Dissolved Oxygen Criteria for Use II Waters.

(a) This criteria is the same as for Use 1 waters, except for the Chesapeake Bay mainstem and associated tidal tributary subcategories.

(b) Seasonal and Migratory Fish Spawning and Nursery Subcategory. The dissolved oxygen concentrations in areas designated as migratory spawning and nursery seasonal use shall be:

(i) Greater than or equal to 6 milligrams/liter for a 7-day averaging period from February 1 through May 31;

(ii) Greater than or equal to 5 milligrams/liter as an instantaneous minimum from February 1 through May 31; and

(iii) Applicable to the open-water fish and shellfish subcategory criteria from June 1 to January 31.

(c) The seasonal shallow-water submerged aquatic vegetation subcategory is the same as for the open-water fish and shellfish subcategory year-round.

(d) Open-Water Fish and Shellfish Subcategory. The dissolved oxygen concentrations in areas designated as open-water fish and shellfish subcategory shall be:

(i) Greater than or equal to 5.5 milligrams/liter for a 30-day averaging period year-round in tidal fresh waters (salinity less than or equal to 0.5 parts per thousand);

(ii) Greater than or equal to 5 milligrams/liter for a 30-day averaging period year-round (salinity greater than 0.5 parts per thousand);

(iii) Greater than or equal to 4.0 milligrams/liter for a 7-day averaging period year-round;

(iv) Greater than or equal to 3.2 milligrams/liter as an instantaneous minimum year-round; and

(v) For protection of the endangered shortnose sturgeon, greater than or equal to 4.3 milligrams/liter as an instantaneous minimum at water column temperatures greater than 29°C (77°F).

(e) Seasonal Deep-Water Fish and Shellfish Subcategory. The dissolved oxygen concentrations in areas designated as seasonal deep-water fish and shellfish subcategory shall be:

(i) Greater than or equal to 3.0 milligrams/liter for a 30-day averaging period from June 1 through September 30;

(ii) Greater than or equal to 2.3 milligrams/liter for a 1-day averaging period from June 1 through September 30;

(iii) Greater than or equal to 1.7 milligrams/liter as an instantaneous minimum from June 1 through September 30;

(iv) The open-water fish and shellfish subcategory criteria apply from October 1 to May 31;

(v) For the dissolved oxygen criteria restoration variance for Chesapeake Bay Mainstem Segment 4 mesohaline (CB4MH) seasonal deep-water fish and shellfish subcategory, not lower for dissolved oxygen in segment CB4MH than the stated criteria for the seasonal deep-water seasonal fish and shellfish use for more than 7 percent spatially and temporally (in combination), from June 1 to September 30; and

(vi) For dissolved oxygen criteria restoration variance for Patapsco River mesohaline (PATMH) seasonal deep-water fish and shellfish subcategory, not lower for dissolved oxygen in segment PATMH than the stated criteria for the deep-water seasonal fish and shellfish use for more than 7 percent spatially and temporally (in combination), from June 1 to September 30.

(f) Seasonal Deep-Channel Refuge Subcategory. The dissolved oxygen concentrations in areas designated as deep-channel seasonal refuge use shall be:

(i) Greater than or equal to 1.0 milligrams/liter as an instantaneous minimum from June 1 through September 30 except for Chesapeake Bay segments subject to variances;

(ii) For dissolved oxygen criteria restoration variance for Chesapeake Bay Mainstem Segment 4 mesohaline (CB4MH) deep-channel refuge subcategory, not lower for dissolved oxygen in segment CB4MH than the stated criteria for the seasonal deep-channel refuge for more than 2 percent spatially or temporally (in combination), from June 1 to September

30; and

(iii) The same as for the open-water fish and shellfish subcategory from October 1 to May 31.

(g) Implementation of the Dissolved Oxygen Water Quality Standard. The attainment of the dissolved oxygen criteria that apply to the Chesapeake Bay and tidally influenced tributary waters shall be determined consistent with the guidelines established in the 2003 U.S. Environmental Protection Agency publication "Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll a for the Chesapeake Bay and its Tidal Tributaries (EPA 903-R-03-002)" and the "Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll a for the Chesapeake Bay and its Tidal Tributaries—2004 Addendum (EPA 903-R-04-005)" which are incorporated by reference.

(h) Restoration Variance. The percentage of allowable exceedance for restoration variances is based on water quality modeling and incorporates the best available data and assumptions. The restoration variances are temporary, and will be reviewed at a minimum every three years, as required by the Clean Water Act and EPA regulations. The variances may be modified based on new data or assumptions incorporated into the water quality model.

(9) Water Clarity Criteria for Seasonal Shallow-Water Submerged Aquatic Vegetation Subcategory.

(a) Water Clarity Criteria Measurement. The attainment of the water clarity criteria for a given Bay segment can be determined using any of the following methods:

(i) Shallow-water acreage meets or exceeds the percent-light-through-water (PLW) criteria expressed in Secchi depth equivalence (Table 1) at the segment specific application depth specified in Regulation .08 of this chapter (excludes no grow zones);

(ii) Submerged aquatic vegetation (SAV) acreage meets or exceeds the acreage restoration goal (Table 2); or

(iii) Shallow-water acreage meeting or exceeding the Secchi depth requirements in combination with actual SAV acreage equal or exceed the SAV restoration goal acreage.

(b) Table 1. Numerical Water Clarity Criteria (in Secchi Depth Equivalents) for General Application to Shallow Water Aquatic Vegetation Bay Grass Designated Use (Application Depths Given in 0.5 Meter Attainment Intervals<sup>1</sup>).

Salinity Regime	Water Clarity Criteria as Percent Light through Water	Water Clarity Criteria as Secchi Depth (meters)				Seasonal Application
		Water Clarity Criteria Application Depths (meters)				
		0.5	1.0	1.5	2.0	
		Secchi Depth Equivalents for Criteria Application Depth				
Tidal Fresh	13%	0.4	0.7	1.1	1.4	April 1 to October 1
Oligohaline	13%	0.4	0.7	1.1	1.4	April 1 to October 1
Mesohaline	22%	0.5	1.0	1.4	1.9	April 1 to October 1

<sup>1</sup>Based on application of the formula  $PLW = 100\exp(-K_d Z)$ , the appropriate PLW criterion value and the selected application depth (Z) are inserted and the equation is solved for  $K_d$ . The generated  $K_d$  value is then converted to Secchi depth (in meters) using the conversion factor  $K_d = 1.45/\text{Secchi depth}$ .

(c) Table 2. SAV Acreage Restoration Goals.

Segment Description <sup>1</sup>	Segment Designator	SAV Acreage Restoration Goal	Secchi Application Depth
Northern Chesapeake Bay	CB1TF2	12,149	2 meters
Northern Chesapeake Bay	CB1TF1	754	1.0 meters
Lower Pocomoke River Mesohaline	POCMH	877 <sup>2</sup>	1.0 meters
Manokin River Mesohaline	MANMH1	4,294	2.0 meters

Manokin River Mesohaline	MANMH2	59	0.5 meters
Big Annemessex River Mesohaline	BIGMH1	2,021	2.0 meters
Big Annemessex River Mesohaline	BIGMH2	22	0.5 meters
Tangier Sound Mesohaline	TANMH1	24,683 <sup>2</sup>	2.0 meters
Tangier Sound Mesohaline	TANMH2	74	0.5 meters
Middle Nanticoke River Oligohaline	NANOH	12	0.5 meters
Lower Nanticoke River Mesohaline	NANMH	3	0.5 meters
Wicomico River Mesohaline	WICMH	3	0.5 meters
Fishing Bay Mesohaline	FSBMH	197	0.5 meters
Middle Choptank River Oligohaline	CHOOH	72	0.5 meters
Lower Choptank River Mesohaline	CHOMH2	1,621	1.0 meters
Mouth of Choptank River Mesohaline	CHOMH1	8,184	2.0 meters
Little Choptank River Mesohaline	LCHMH	4,076	2.0 meters
Honga River Mesohaline	HNGMH	7,761	2.0 meters
Eastern Bay	EASMH	6,209	2.0 meters
Middle Chester River Oligohaline	CHSOH	77	0.5 meters
Lower Chester River Mesohaline	CHSMH	2,928	1.0 meters
Chesapeake & Delaware (C&D) Canal	C&DOH	7	0.5 meters
Northeast River Tidal Fresh	NORTF	89	0.5 meters
Bohemia River Oligohaline	BOHOH	354	0.5 meters
Elk River Oligohaline	ELKOH1	1,844	2.0 meters
Elk River Oligohaline	ELKOH2	190	0.5 meters
Sassafras River Oligohaline	SASOH1	1,073	2.0 meters
Sassafras River Oligohaline	SASOH2	95	0.5 meters
Bush River Oligohaline	BSHOH	350	0.5 meters
Gunpowder River Oligohaline	GUNOH2	572	2.0 meters
Mouth of Gunpowder River	GUNOH1	1,860	0.5 meters
Middle River Oligohaline	MIDOH	879	2.0 meters
Patapsco River Mesohaline	PATMH	389	1.0 meters
Magothy River Mesohaline	MAGMH	579	1.0 meters
Severn River Mesohaline	SEVMH	455	1.0 meters
South River Mesohaline	SOUMH	479	1.0 meters
Rhode River Mesohaline	RHDMH	60	0.5 meters
West River Mesohaline	WSTMH	238	0.5 meters
Upper Patuxent River Tidal Fresh	PAXTF	205	0.5 meters
Middle Patuxent River Oligohaline	PAXOH	115	0.5 meters
Lower Patuxent River Mesohaline	PAXMH1	1,459	2.0 meters
Lower Patuxent River Mesohaline	PAXMH2	172	0.5 meters
Lower Patuxent River Mesohaline	PAXMH4	1	0.5 meters
Lower Patuxent River Mesohaline	PAXMH5	2	0.5 meters
Lower Potomac River Tidal Fresh	POTTF	2,142 <sup>2</sup>	2.0 meters
Piscataway Creek Tidal Fresh	PISTF	789	2.0 meters
Mattawoman Creek Tidal Fresh	MATTF	792	1.0 meters
Lower Potomac River Oligohaline	POTOH1	1,387 <sup>2</sup>	2.0 meters
Lower Potomac River Oligohaline	POTOH2	262	1.0 meters
Lower Potomac River Oligohaline	POTOH3	1,153	1.0 meters

Lower Potomac River Mesohaline	POTMH	7,088 <sup>2</sup>	1.0 meters
Upper Chesapeake Bay	CB2OH	705	0.5 meters
Upper Central Chesapeake Bay	CB3MH	1,370	0.5 meters
Middle Central Chesapeake Bay	CB4MH	2,533	2.0 meters
Lower Central Chesapeake Bay	CB5MH	8,270 <sup>2</sup>	2.0 meters

<sup>1</sup> The segments Middle Pocomoke Oligohaline (POCOH-application depth = 0.5 meters), Upper Chester River Tidal Fresh (CHSTP-application depth = 0.5 meters), Back River Oligohaline (BACOH-application depth = 0.5 meters), and West Branch Patuxent River (WBRTF-application depth = 0.5 meters), and Lower Patuxent River Mesohaline Subsegments 3 and 6 (PAXMH3 & PAXMH6-application depths = 0.5 meters), and the Anacostia River Tidal Fresh (ANATF-application depth = 0.5 meters) are not listed above because the SAV Restoration goal for each segment is 0 acres, based on the required historical SAV presence criteria used to set the restoration goal for each segment. These segments have been assigned a water clarity criteria and application depth. Attainment of the shallow-water designated use will be determined using the method outlined in §C(9)(a)(i)—(iii) and (c) of this regulation.

<sup>2</sup>Maryland portion of the segment.

(d) SAV No Grow Zones. Certain Chesapeake Bay segments contain areas designated as shallow water use that are not suitable for growth of submerged aquatic vegetation due to natural conditions. Figures V-1 to V-12 of the "Technical Support Document for Identification of Chesapeake Bay Designated Uses and Attainability (EPA 903-R-04-006)" which is incorporated by reference, indicate the SAV No Grow Zones.

(e) Implementation. The attainment of the water clarity criteria that apply to the seasonal shallow-water submerged aquatic vegetation use subcategory in the Chesapeake Bay and tidally influenced tributary waters will be determined consistent with the guidelines documented within the 2003 U.S. Environmental Protection Agency publication "Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll a for the Chesapeake Bay and its Tidal Tributaries (EPA 903-R-04-005)", the "Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll a for the Chesapeake Bay and its Tidal Tributaries-2004 Addendum (EPA 903-R-04-005)", and the Technical Support Document for Identification of Chesapeake Bay Designated Uses and Attainability-2004 Addendum (EPA 903-R-04-006) which are incorporated by reference.

(10) Chlorophyll a. Concentrations of chlorophyll a in free-floating microscopic aquatic plants (algae) may not exceed levels that result in ecologically undesirable consequences that would render tidal waters unsuitable for designated uses.

#### (11) Compliance Schedules for Protection of Downstream Uses in Tidal Waters.

(a) The compliance schedule provisions of COMAR 26.08.04.02C are applicable to discharge permits issued to existing dischargers which contain new or revised effluent limitations based on water quality standards contained in §C(8) and (9) of this regulation.

(b) An upstream state issuing discharge permits to existing dischargers which contain new or revised effluent limitations based on the water quality standards contained in §C(8) and (9) of this regulation may apply the compliance schedule provisions of COMAR 26.08.04.02C.

C-1. Criteria for Use II-P Waters—Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting and Public Water Supplies. The following criteria apply:

(1) The criteria for Use II waters in §C(1)—(8), (9)(a)—(c), (10), and (11); and

(2) All toxic substance criteria:

(a) For protection of fresh water and freshwater-adapted estuarine aquatic organisms apply; and

(b) To protect public water supplies and the wholesomeness of fish and shellfish for human consumption.

#### D. Criteria for Use III Waters—Nontidal Cold Water.

(1) Bacteriological—same as Use I waters.

(2) Dissolved Oxygen. The dissolved oxygen concentration may not be less than 5 milligrams/liter at any time, with a minimum daily average of not less than 6 milligrams/liter.

(3) Temperature.

(a) The maximum temperature outside the mixing zone determined in accordance with Regulation .05 of this chapter or COMAR 26.08.03.03—.05 may not exceed 68°F (20°C) or the ambient temperature of the surface waters, whichever is greater.

(b) Ambient temperature—Same as Use I.

(c) A thermal barrier that adversely affects salmonid fish may not be established.

(d) It is the policy of the State that riparian forest buffer adjacent to Use III waters shall be retained whenever possible to maintain the temperatures essential to meeting this criterion.

(4) pH—same as Use I waters.

(5) Turbidity—same as Use I waters.

(6) Color—Same as Use I waters.

(7) Total Residual Chlorine (TRC). Except as provided in COMAR 26.08.03.06, the Department may not issue a permit allowing the use of chlorine or chlorine-containing compounds in the treatment of wastewaters discharging to Use III and Use III-P waters.

(8) Toxic Substance Criteria. All toxic substance criteria to protect:

(a) Fresh water aquatic organisms apply; and

(b) The wholesomeness of fish for human consumption apply.

E. Criteria for Use III-P Waters—Nontidal Cold Water and Public Water Supplies.

(1) Exception. Authorized operation of the Little Seneca Creek Dam means that all operational activities permitted are met under the conditions of a dam operating permit issued by the Department of Natural Resources under Natural Resources Article, §§8-801—8-814, Annotated Code of Maryland, and COMAR 08.05.03. Injury resulting from the authorized operation of Little Seneca Creek Dam to the Use III natural trout fishery recognized in the stream use designation assigned to Little Seneca Creek in Regulation .08 of this chapter is not considered a violation of this chapter.

(2) The following criteria apply:

(a) The criteria for Use III waters in §D(1)—(7); and

(b) All toxic substance criteria to protect:

(i) Fresh water aquatic organisms, and

(ii) Public water supplies and the wholesomeness of fish for human consumption.

F. Criteria for Use IV Waters—Recreational Trout Waters.

(1) Bacteriological—same as Use I waters.

(2) Dissolved oxygen—same as Use I waters.

(3) Temperature.

(a) The maximum temperature outside the mixing zone determined in accordance with Regulation .05 of this chapter or COMAR 26.08.03.03—.05 may not exceed 75°F (23.9°C) or the ambient temperature of the surface waters, whichever is greater.

(b) Ambient temperature—Same as Use I.

(c) A thermal barrier that adversely affects salmonid fish may not be established.

(d) It is the policy of the State that riparian forest buffer adjacent to Use IV waters shall be retained whenever possible to maintain the temperatures essential to meeting this criterion.

(4) pH—same as Use I waters.

(5) Turbidity—same as Use I waters.

(6) Color—same as for Use I waters.

(7) Toxic Substance Criteria. All toxic substance criteria to protect:

(a) Fresh water aquatic organisms apply; and

(b) The wholesomeness of fish for human consumption apply.

G. Criteria for Use IV-P Waters—Recreational Trout Waters and Public Water Supplies. The following criteria apply:

(1) The criteria for Use IV waters in §F(1)—(6); and

(2) Toxic Substance Criteria. All toxic substance criteria to protect:

(a) Fresh water aquatic organisms, and

(b) Public water supplies and the wholesomeness of fish for human consumption.

26.08.02.03-2

**.03-2 Numerical Criteria for Toxic Substances in Surface Waters.**

A. Numerical toxic substance criteria shall be applied:

- (1) In intermittent streams, at the end of the discharge pipe; and
- (2) In all other water bodies, at the edge of the mixing zones determined in accordance with Regulation .05C—E of this chapter.

B. Acceptable laboratory methods for the detection and measurement of toxic substances shall be specified by the Department.

C. Site-specific numerical toxic substance criteria may be developed on a site-specific basis. A person who wishes to develop a site-specific numerical toxic substance criterion shall:

- (1) Do so in accordance with a scientifically defensible methodology approved by the Department; and
- (2) Notify the Department of their intent not later than the time specified in COMAR 26.08.04.01-1.

D. The toxicity of certain substances in Tables 1 and 4 of §G of this regulation is increased or decreased by hardness or pH. For these toxic substances:

- (1) The Department may:
  - (a) Require the discharger to provide site-specific measurements; or
  - (b) Recalculate the aquatic life criteria based on available water quality data.
- (2) The permittee may voluntarily provide site-specific information for the recalculation of the criteria. It is within the Department's discretion to determine the weight given this information.
- (3) After reviewing the information provided in §D(1) or (2), the Department shall determine if one or more of these criteria should be modified at a particular location.

E. In those cases where numerical toxic substance criteria for aquatic life protection and protection of human health both apply, the most restrictive of the criteria shall be used.

F. Acute and chronic numeric toxic substance criteria for fresh, estuarine, and salt water aquatic life protection and for human health protection are shown in Tables 1—4 of §G. For the instream application of the acute and chronic criteria for the protection of aquatic life in Tables 1—4 of §G of this regulation:

- (1) The metals shall be measured as dissolved metal or as biologically available equivalence and may be translated to total recoverable measurements for waste load allocation to derive discharge permit limits using the procedures for the biological translator or chemical translator described in COMAR 26.08.04;
- (2) The organic substances shall be measured directly or as biologically available equivalence and may be translated for waste load allocation to derive discharge permit limits using the procedures for the biological translator described in COMAR 26.08.04; and
- (3) Cyanide shall be measured as either free cyanide or cyanide amenable to chlorination.

G. Tables of Ambient Water Quality Criteria.

(1) Table 1. Toxic Substances Criteria for Ambient Surface Waters-Inorganic Substances.

Substance CAS		Aquatic Life (µg/L)						Human Health for Consumption of (Risk Level = 10 <sup>-5</sup> ) (µg/L)	
		Fresh Water		Estuarine Water		Salt Water		Drinking Water + Organism	Organism Only
		Acute	Chronic	Acute	Chronic	Acute	Chronic		
Antimony	7440360							5.6	640
Arsenic <sup>1</sup>	7440382	340	150			69	36	10	41 <sup>a</sup>
Asbestos	1332214							7 million fibers/L	
Barium	7440393							2,000	
Beryllium <sup>3</sup>								4	
Cadmium <sup>1, 3</sup>	7440439	2.0	0.25			40	8.8	5	
Chlorine <sup>2</sup>	7782505	19	11			13	7.5		
Chromium (total)	7440473							100	
Chromium III <sup>1</sup>	16065831	570	74						
Chromium VI	18540299	16	11			1100	50		
Copper <sup>1</sup>	7440508	13	9	6.1		4.8	3.1	1,300	
Cyanide	57125	22	5.2			1	1	700	220,000
Lead <sup>1</sup>	7439921	65	2.5			210	8.1		
Mercury	7439976	1.4	0.77			1.8	0.94		
Methylmercury	22967926								0.3 mg/kg
Nickel <sup>1</sup>	7440020	470	52			74	8.2	610	4,600
Selenium	7782492	20	5			290	71	170	4,200
Silver <sup>1</sup>	7440224	3.2				1.9			
Thallium	7440280							1.7	6.3
Zinc <sup>1</sup>	7440666	120	120			90	81	7,400	26,000

<sup>1</sup> Refer to §D of this regulation.

<sup>2</sup>The more stringent of these criteria or the discharge requirements in COMAR 26.08.03.06 shall be used as the basis for determining discharge permit limitations.

<sup>3</sup> The drinking water + organism criterion is the Safe Drinking Water Maximum Contaminant Level.

<sup>a</sup> This criterion will be applied against the actual measurement of inorganic arsenic (As+3) rather than total arsenic.

(2) Table 2. Toxic Substances for Ambient Water Quality Criteria-Organic Compounds.

Substance CAS		Aquatic Life (µg/L)				Human Health for Consumption of: (Risk Level = 10 <sup>-5</sup> ) (µg/L)	
		Fresh Water		Salt Water		Water + Organism	Organism Only
		Acute	Chronic	Acute	Chronic		
1,1 Dichloroethylene							

(DCE)	75354					0.57	32
1,1,1-Trichloroethane (TCA) <sup>2</sup>	71556					200	
1,1,2,2-Tetrachloroethane	79345					1.7	4.0
1,1,2-Trichloroethane	79005					5.9	160
1,2,4-Trichlorobenzene	120821					260	940
1,2-Dichlorobenzene	95501					2,700	17,000
1,2-Dichloroethane	107062					3.8	370
1,2-Dichloropropane	78875					5.0	150
1,2-Diphenylhydrazine	122667					0.36	2.0
1,2-Trans-Dichloroethylene	156605					700	140,000
1,3-Dichlorobenzene	541731					320	960
1,3-Dichloropropene	542756					10	1,700
1,4-Dichlorobenzene	106467					400	2,600
2,4,6-Trichlorophenol	88062					14	24
2,4-Dichlorophenol	120832					77	290
2,4-Dimethylphenol	105679					380	850
2,4-Dinitrophenol	51285					69	5,300
2,4-Dinitrotoluene	121142					1.1	34
2-Chloronaphthalene	91587					1,000	1,600
2-Chlorophenol	95578					81	150
2-Methyl-4,6-Dinitrophenol	534521					13	280
3,3'-Dichlorobenzidine	91941					0.21	0.28
Acrolein	107028					190	290
Acrylonitrile	107131					0.51	2.5
Benzene	71432					22	510
Benzidine	92875					0.00086	0.0020
Bis(2-Chloroethyl)Ether	111444					0.30	5.3
Bis(2-Chloroisopropyl) Ether	108601					1400	65,000
Bromoform <sup>2</sup>	75252					See Trihalomethanes	1,400
Carbon tetrachloride	56235					2.3	16
Chlorobenzene	108907					680	21,000
Chlorodibromomethane <sup>2</sup>	124481					See Trihalomethanes	130
Chloroform <sup>2</sup>	67663					See Trihalomethanes	4,700
Dichlorobromomethane <sup>2</sup>	75274					See Trihalomethanes	170
Ethylbenzene	100414					3,100	29,000

Hexachlorobenzene	118741					0.0028	0.0029
Hexachlorobutadiene	87683					4.4	180
Hexachlorocyclopentadiene	77474					240	17,000
Hexachloroethane	67721					14	33
Isophorone	78591					350	9,600
Methyl bromide	74839					47	1,500
Methylene chloride	75092					46	5,900
Nitrobenzene	98953					17	690
N-Nitrosodimethylamine	62759					0.0069	30
N-Nitrosodi-n-Propylamine	621647					0.050	5.1
N-Nitrosodiphenylamine	86306					33	60
Phenol	108952					21,000	1,700,000
Tetrachloroethylene	127184					6.9	33
Toluene	10883					6,800	200,000
Trichloroethylene (TCE)	79016					25	300
Trihalomethanes <sup>2</sup>						80	
Vinyl chloride	75014					20	5,300

<sup>1</sup> The drinking water + organism criterion is the Safe Drinking Water Maximum Contaminant Level.

<sup>2</sup> Four compounds (bromoform, chlorodibromomethane, chloroform, and dichlorodibromomethane) are found in combination and comprise a category of contaminants called "trihalomethanes" formed as a result of drinking water disinfection. The concentration of any of these compounds individually, or all of them in sum, may not exceed 80 micrograms per liter. This criterion is equal to the Safe Drinking Water Act Maximum Contaminant Level.

(3) Table 3. Toxic Substances for Ambient Water Quality Criteria-Polycyclic Aromatic Hydrocarbons and Phthalates.

Substance CAS		Aquatic Life (µg/L)				Human Health for Consumption of: (Risk Level = 10 <sup>-5</sup> ) (µg/L)	
		Fresh Water		Salt Water			
		Acute	Chronic	Acute	Chronic	Water + Organism	Organism Only
Acenaphthene	83329					670	990
Anthracene	120127					8,300	40,000
Benzo(a)Anthracene	56553					0.038	0.18
Benzo(a)Pyrene	50328					0.038	0.18
Benzo(b)Fluoranthene	205992					0.038	0.18
Benzo(k)Fluoranthene	207089					0.038	0.18
Chrysene	218019					0.038	0.18
Dibenzo(a,h)Anthracene	53703					0.038	0.18
Fluoranthene	206440					130	140
Fluorene	86737					1,100	5,300
Ideno 1,2,3-cdPyrene	193395					0.038	0.18

Pyrene	129000					830	4,000
Bis(2-Ethylhexyl) Phthalate	117817					12	22
Butylbenzyl Phthalate	85687					1,500	1,900
Diethyl Phthalate	84662					17,000	44,000
Dimethyl Phthalate	131113					270,000	1,100,000
Di-n-Butyl Phthalate	84742					2,000	4,500

(4) Table 4. Toxic Substances for Ambient Water Quality Criteria-Pesticides and Chlorinated Compounds.

Substance CAS		Aquatic Life (µg/L)				Human Health for Consumption of: (Risk Level = 10 <sup>-5</sup> ) (µg/L)	
		Fresh Water		Salt Water			
		Acute	Chronic	Acute	Chronic	Water + Organism	Organism Only
2, 3, 7, 8-TCDD (Dioxin)	1746016					0.00000005	0.00000051
4,4'-DDD	72548					0.0031	0.0031
4,4'-DDE	72559					0.0022	0.0022
4,4'-DDT	50293	1.1	0.001	0.13	0.001	0.0022	0.0022
Aldrin	309002	3		1.3		0.00049	0.00050
Alpha-BHC	319846					0.026	0.049
Alpha-Endosulfan	959988	0.22	0.056	0.034	0.0087	62	89
Atrazine	319857					3	
Beta-BHC	319857					0.091	0.17
Beta-Endosulfan	33213659	0.22	0.056	0.034	0.0087	62	89
Chlordane	57749	2.4	0.0043	0.09	0.004	0.0080	0.0081
Chlorpyrifos	2921882	0.083					
Dieldrin	60571	0.24	0.056	0.71	0.0019	0.00052	0.00054
Endosulfan Sulfate	1031078					62	89
Endrin	72208	0.086	0.036	0.037	0.0023	0.76	0.81
Endrin Aldehyde	7421934					0.29	0.30
Gamma-BHC (Lindane)	58899	0.95		0.16		0.19	0.63
Heptachlor	76448	0.52	0.0038	0.053	0.0036	0.00079	0.00079
Heptachlor Epoxide	1024573	0.52	0.0038	0.053	0.0036	0.00039	0.00039
Polychlorinated Biphenyls PCBs			0.014		0.03	0.00064	0.00064
Toxaphene	8001352	0.73	0.0002	0.21	0.0002	0.0028	0.0028
Tributyltin (TBT)		0.46	0.063	0.37	0.010		
Pentachlorophenol (PCP) <sup>1</sup>	87865	19	15	13	7.9	2.7	30

<sup>1</sup> Refer to §D of this regulation.

H. Acute Numeric Toxic Substance Criteria for Ammonia for the Protection of Fresh Water Aquatic Life (Table 1).

(1) Presence of Salmonid Fish. In Use III, III-P, IV, and IV-P waters, the concentration of total ammonia (in milligrams of nitrogen per liter) may not exceed the acute criterion listed under "Salmonids Present" in Table 1.

(2) Absence of Salmonid Fish. In Use I and I-P waters, the concentration of total ammonia (in milligrams of nitrogen per liter) may not exceed the acute criterion listed under "Salmonids Absent" in Table 1.

(3) Table 1. Acute Water Quality Criteria for freshwater Aquatic Life (milligrams of nitrogen per liter).

pH	Salmonids Present <sup>1</sup>	Salmonids Absent <sup>2</sup>
6.5	32.6	48.8
6.6	31.3	46.8
6.7	29.8	44.6
6.8	28.1	42.0
6.9	26.2	39.1
7.0	24.1	36.1
7.1	22.0	32.8
7.2	19.7	29.5
7.3	17.5	26.2
7.4	15.4	23.0
7.5	13.3	19.9
7.6	11.4	17.0
7.7	9.65	14.4
7.8	8.11	12.1
7.9	6.77	10.1
8.0	5.62	8.40
8.1	4.64	6.95
8.2	3.83	5.72
8.3	3.15	4.71
8.4	2.59	3.88
8.5	2.14	3.20
8.6	1.77	2.65
8.7	1.47	2.20
8.8	1.23	1.84
8.9	1.04	1.56
9.0	0.885	1.32

<sup>1</sup> The acute water quality criteria for total ammonia where salmonids may be present was calculated using the following equation, which may also be used to calculate unlisted values: Acute water quality criteria for ammonia (salmonids present) =  $[0.275/(1+107.204 - \text{pH})] + [39.0/(1+10^{\text{pH}} - 7.204)]$

<sup>2</sup> The acute water quality criteria for total ammonia where salmonids are absent were calculated using the following equation, which may also be used to calculate unlisted values: Acute water quality criteria for ammonia (salmonids absent) =  $[0.411/(1+107.204 - \text{pH})] + [58.4/(1+10^{\text{pH}} - 7.204)]$

I. Chronic Numeric Toxic Substance Criteria for Ammonia, Expressed as a 30-day Average, for the Protection of Fresh Water Aquatic Life (Tables 1 and 2).

Dissolved Oxygen Criteria (9 VAC 25-260-185)

Designated Use	Criteria Concentration/Duration	Temporal Application
Migratory fish spawning and nursery	7-day mean > 6 mg/L (tidal habitats with 0-0.5 ppt salinity)	February 1 – May 31
	Instantaneous minimum > 5 mg/L	
Open-water <sup>1,2</sup>	30-day mean > 5.5 mg/L (tidal habitats with 0-0.5 ppt salinity)	Year-round
	30-day mean > 5 mg/L (tidal habitats with >0.5 ppt salinity)	
	7-day mean > 4 mg/L	
	Instantaneous minimum > 3.2 mg/L at temperatures < 29°C	
Deep-water	Instantaneous minimum > 4.3 mg/L at temperatures > 29°C	June 1-September 30
	30-day mean > 3 mg/L	
	1-day mean > 2.3 mg/L	
Deep-channel	Instantaneous minimum > 1.7 mg/L	June 1-September 30
	Instantaneous minimum > 1 mg/L	

<sup>1</sup>See subsection aa of 9 VAC 25-260-310 for site specific seasonal open-water dissolved oxygen criteria applicable to the tidal Mattaponi and Pamunkey Rivers and their tidal tributaries.

<sup>2</sup>In applying this open-water instantaneous criterion to the Chesapeake Bay and its tidal tributaries where the existing water quality for dissolved oxygen exceeds an instantaneous minimum of 3.2 mg/L, that higher water quality for dissolved oxygen shall be provided antidegradation protection in accordance with section 30 subsection A.2 of the Water Quality Standards.

# FRESHWATER WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Attachment 10

Facility Name: Quantico Mainside WWTP

Permit No.: VA0028363

Receiving Stream: UT to Quantico Bight

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		Stream Flows		Mixing Information		Effluent Information	
Mean Hardness (as CaCO3) =	50 mg/L	1Q10 (Annual) =	9 MGD	Annual - 1Q10 Mix =	100 %	Mean Hardness (as CaCO3) =	50 mg/L
90% Temperature (Annual) =	25 deg C	7Q10 (Annual) =	9 MGD	- 7Q10 Mix =	100 %	90% Temp (Annual) =	deg C
90% Temperature (Wet season) =	15 deg C	30Q10 (Annual) =	9 MGD	- 30Q10 Mix =	100 %	90% Temp (Wet season) =	deg C
90% Maximum pH =	7.7 SU	1Q10 (Wet season) =	9 MGD	Wet Season - 1Q10 Mix =	100 %	90% Maximum pH =	SU
10% Maximum pH =	SU	30Q10 (Wet season) =	9 MGD	- 30Q10 Mix =	100 %	10% Maximum pH =	SU
Tier Designation (1 or 2) =	1	30Q5 =	9 MGD			Discharge Flow =	1 MGD
Public Water Supply (PWS) Y/N? =	n	Harmonic Mean =	9 MGD				
Trout Present Y/N? =	n	Annual Average =	na MGD				
Early Life Stages Present Y/N? =	y						

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenaphthene	0	--	--	na	2.7E+03	--	--	na	2.7E+04	--	--	--	--	--	--	--	--	--	--	na	2.7E+04
Acrolein	0	--	--	na	7.8E+02	--	--	na	7.8E+03	--	--	--	--	--	--	--	--	--	--	na	7.8E+03
Acrylonitrile <sup>c</sup>	0	--	--	na	6.6E+00	--	--	na	6.6E+01	--	--	--	--	--	--	--	--	--	--	na	6.6E+01
Aldrin <sup>c</sup>	0	3.0E+00	--	na	1.4E-03	3.0E+01	--	na	1.4E-02	--	--	--	--	--	--	--	--	3.0E+01	--	na	1.4E-02
Ammonia-N (mg/l) (Yearly)	0	5.84E+01	4.24E+00	na	--	5.8E+02	4.2E+01	na	--	--	--	--	--	--	--	--	--	5.8E+02	4.2E+01	na	--
Ammonia-N (mg/l) (High Flow)	0	5.84E+01	7.09E+00	na	--	5.8E+02	7.1E+01	na	--	--	--	--	--	--	--	--	--	5.8E+02	7.1E+01	na	--
Anthracene	0	--	--	na	1.1E+05	--	--	na	1.1E+06	--	--	--	--	--	--	--	--	--	--	na	1.1E+06
Antimony	0	--	--	na	4.3E+03	--	--	na	4.3E+04	--	--	--	--	--	--	--	--	--	--	na	4.3E+04
Arsenic	0	3.4E+02	1.5E+02	na	--	3.4E+03	1.5E+03	na	--	--	--	--	--	--	--	--	--	3.4E+03	1.5E+03	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene <sup>c</sup>	0	--	--	na	7.1E+02	--	--	na	7.1E+03	--	--	--	--	--	--	--	--	--	--	na	7.1E+03
Benzidine <sup>c</sup>	0	--	--	na	5.4E-03	--	--	na	5.4E-02	--	--	--	--	--	--	--	--	--	--	na	5.4E-02
Benzo (a) anthracene <sup>c</sup>	0	--	--	na	4.9E-01	--	--	na	4.9E+00	--	--	--	--	--	--	--	--	--	--	na	4.9E+00
Benzo (b) fluoranthene <sup>c</sup>	0	--	--	na	4.9E-01	--	--	na	4.9E+00	--	--	--	--	--	--	--	--	--	--	na	4.9E+00
Benzo (k) fluoranthene <sup>c</sup>	0	--	--	na	4.9E-01	--	--	na	4.9E+00	--	--	--	--	--	--	--	--	--	--	na	4.9E+00
Benzo (a) pyrene <sup>c</sup>	0	--	--	na	4.9E-01	--	--	na	4.9E+00	--	--	--	--	--	--	--	--	--	--	na	4.9E+00
Bis2-Chloroethyl Ether	0	--	--	na	1.4E+01	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	--	--	na	1.4E+02
Bis2-Chloroisopropyl Ether	0	--	--	na	1.7E+05	--	--	na	1.7E+06	--	--	--	--	--	--	--	--	--	--	na	1.7E+06
Bromoform <sup>c</sup>	0	--	--	na	3.6E+03	--	--	na	3.6E+04	--	--	--	--	--	--	--	--	--	--	na	3.6E+04
Butylbenzylphthalate	0	--	--	na	5.2E+03	--	--	na	5.2E+04	--	--	--	--	--	--	--	--	--	--	na	5.2E+04
Cadmium	0	1.8E+00	6.6E-01	na	--	1.8E+01	6.6E+00	na	--	--	--	--	--	--	--	--	--	1.8E+01	6.6E+00	na	--
Carbon Tetrachloride <sup>c</sup>	0	--	--	na	4.4E+01	--	--	na	4.4E+02	--	--	--	--	--	--	--	--	--	--	na	4.4E+02
Chlordane <sup>c</sup>	0	2.4E+00	4.3E-03	na	2.2E-02	2.4E+01	4.3E-02	na	2.2E-01	--	--	--	--	--	--	--	--	2.4E+01	4.3E-02	na	2.2E-01
Chloride	0	8.6E+05	2.3E+05	na	--	8.6E+06	2.3E+06	na	--	--	--	--	--	--	--	--	--	8.6E+06	2.3E+06	na	--
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+02	1.1E+02	na	--	--	--	--	--	--	--	--	--	1.9E+02	1.1E+02	na	--
Chlorobenzene	0	--	--	na	2.1E+04	--	--	na	2.1E+05	--	--	--	--	--	--	--	--	--	--	na	2.1E+05

Acute WLA Calculation 10:1 Dilution  
Stream Flows & Discharge Flows are not actual values.

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane <sup>C</sup>	0	--	--	na	3.4E+02	--	--	na	3.4E+03	--	--	--	--	--	--	--	--	--	--	na	3.4E+03
Chloroform <sup>C</sup>	0	--	--	na	2.9E+04	--	--	na	2.9E+05	--	--	--	--	--	--	--	--	--	--	na	2.9E+05
2-Chloronaphthalene	0	--	--	na	4.3E+03	--	--	na	4.3E+04	--	--	--	--	--	--	--	--	--	--	na	4.3E+04
2-Chlorophenol	0	--	--	na	4.0E+02	--	--	na	4.0E+03	--	--	--	--	--	--	--	--	--	--	na	4.0E+03
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.3E-01	4.1E-01	na	--	--	--	--	--	--	--	--	--	8.3E-01	4.1E-01	na	--
Chromium III	0	3.2E+02	4.2E+01	na	--	3.2E+03	4.2E+02	na	--	--	--	--	--	--	--	--	--	3.2E+03	4.2E+02	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+02	1.1E+02	na	--	--	--	--	--	--	--	--	--	1.6E+02	1.1E+02	na	--
Chromium, Total	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene <sup>C</sup>	0	--	--	na	4.9E-01	--	--	na	4.9E+00	--	--	--	--	--	--	--	--	--	--	na	4.9E+00
Copper	0	7.0E+00	5.0E+00	na	--	7.0E+01	5.0E+01	na	--	--	--	--	--	--	--	--	--	7.0E+01	5.0E+01	na	--
Cyanide	0	2.2E+01	5.2E+00	na	2.2E+05	2.2E+02	5.2E+01	na	2.2E+06	--	--	--	--	--	--	--	--	2.2E+02	5.2E+01	na	2.2E+06
DDD <sup>C</sup>	0	--	--	na	8.4E-03	--	--	na	8.4E-02	--	--	--	--	--	--	--	--	--	--	na	8.4E-02
DDE <sup>C</sup>	0	--	--	na	5.9E-03	--	--	na	5.9E-02	--	--	--	--	--	--	--	--	--	--	na	5.9E-02
DDT <sup>C</sup>	0	1.1E+00	1.0E-03	na	5.9E-03	1.1E+01	1.0E-02	na	5.9E-02	--	--	--	--	--	--	--	--	1.1E+01	1.0E-02	na	5.9E-02
Demeton	0	--	1.0E-01	na	--	--	1.0E+00	na	--	--	--	--	--	--	--	--	--	--	1.0E+00	na	--
Dibenz(a,h)anthracene <sup>C</sup>	0	--	--	na	4.9E-01	--	--	na	4.9E+00	--	--	--	--	--	--	--	--	--	--	na	4.9E+00
Dibutyl phthalate	0	--	--	na	1.2E+04	--	--	na	1.2E+05	--	--	--	--	--	--	--	--	--	--	na	1.2E+05
Dichloromethane (Methylene Chloride) <sup>C</sup>	0	--	--	na	1.6E+04	--	--	na	1.6E+05	--	--	--	--	--	--	--	--	--	--	na	1.6E+05
1,2-Dichlorobenzene	0	--	--	na	1.7E+04	--	--	na	1.7E+05	--	--	--	--	--	--	--	--	--	--	na	1.7E+05
1,3-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	2.6E+04	--	--	--	--	--	--	--	--	--	--	na	2.6E+04
1,4-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	2.6E+04	--	--	--	--	--	--	--	--	--	--	na	2.6E+04
3,3-Dichlorobenzidine <sup>C</sup>	0	--	--	na	7.7E-01	--	--	na	7.7E+00	--	--	--	--	--	--	--	--	--	--	na	7.7E+00
Dichlorobromomethane <sup>C</sup>	0	--	--	na	4.6E+02	--	--	na	4.6E+03	--	--	--	--	--	--	--	--	--	--	na	4.6E+03
1,2-Dichloroethane <sup>C</sup>	0	--	--	na	9.9E+02	--	--	na	9.9E+03	--	--	--	--	--	--	--	--	--	--	na	9.9E+03
1,1-Dichloroethylene	0	--	--	na	1.7E+04	--	--	na	1.7E+05	--	--	--	--	--	--	--	--	--	--	na	1.7E+05
1,2-trans-dichloroethylene	0	--	--	na	1.4E+05	--	--	na	1.4E+06	--	--	--	--	--	--	--	--	--	--	na	1.4E+06
2,4-Dichlorophenol	0	--	--	na	7.9E+02	--	--	na	7.9E+03	--	--	--	--	--	--	--	--	--	--	na	7.9E+03
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane <sup>C</sup>	0	--	--	na	3.9E+02	--	--	na	3.9E+03	--	--	--	--	--	--	--	--	--	--	na	3.9E+03
1,3-Dichloropropene	0	--	--	na	1.7E+03	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	--	--	na	1.7E+04
Dieldrin <sup>C</sup>	0	2.4E-01	5.6E-02	na	1.4E-03	2.4E+00	5.6E-01	na	1.4E-02	--	--	--	--	--	--	--	--	2.4E+00	5.6E-01	na	1.4E-02
Diethyl Phthalate	0	--	--	na	1.2E+05	--	--	na	1.2E+06	--	--	--	--	--	--	--	--	--	--	na	1.2E+06
Di-2-Ethylhexyl Phthalate <sup>C</sup>	0	--	--	na	5.9E+01	--	--	na	5.9E+02	--	--	--	--	--	--	--	--	--	--	na	5.9E+02
2,4-Dimethylphenol	0	--	--	na	2.3E+03	--	--	na	2.3E+04	--	--	--	--	--	--	--	--	--	--	na	2.3E+04
Dimethyl Phthalate	0	--	--	na	2.9E+06	--	--	na	2.9E+07	--	--	--	--	--	--	--	--	--	--	na	2.9E+07
Di-n-Butyl Phthalate	0	--	--	na	1.2E+04	--	--	na	1.2E+05	--	--	--	--	--	--	--	--	--	--	na	1.2E+05
2,4 Dinitrophenol	0	--	--	na	1.4E+04	--	--	na	1.4E+05	--	--	--	--	--	--	--	--	--	--	na	1.4E+05
2-Methyl-4,6-Dinitrophenol	0	--	--	na	7.65E+02	--	--	na	7.7E+03	--	--	--	--	--	--	--	--	--	--	na	7.7E+03
2,4-Dinitrotoluene <sup>C</sup>	0	--	--	na	9.1E+01	--	--	na	9.1E+02	--	--	--	--	--	--	--	--	--	--	na	9.1E+02
Dioxin (2,3,7,8- tetrachlorodibenzo-p-dioxin) (ppq)	0	--	--	na	1.2E-06	--	--	na	na	--	--	--	--	--	--	--	--	--	--	na	na
1,2-Diphenylhydrazine <sup>C</sup>	0	--	--	na	5.4E+00	--	--	na	5.4E+01	--	--	--	--	--	--	--	--	--	--	na	5.4E+01
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.2E+00	5.6E-01	na	2.4E+03	--	--	--	--	--	--	--	--	2.2E+00	5.6E-01	na	2.4E+03
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.2E+00	5.6E-01	na	2.4E+03	--	--	--	--	--	--	--	--	2.2E+00	5.6E-01	na	2.4E+03
Endosulfan Sulfate	0	--	--	na	2.4E+02	--	--	na	2.4E+03	--	--	--	--	--	--	--	--	--	--	na	2.4E+03
Endrin	0	8.6E-02	3.6E-02	na	8.1E-01	8.6E-01	3.6E-01	na	8.1E+00	--	--	--	--	--	--	--	--	8.6E-01	3.6E-01	na	8.1E+00
Endrin Aldehyde	0	--	--	na	8.1E-01	--	--	na	8.1E+00	--	--	--	--	--	--	--	--	--	--	na	8.1E+00

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.9E+04	--	--	na	2.9E+05	--	--	--	--	--	--	--	--	--	--	na	2.9E+05
Fluoranthene	0	--	--	na	3.7E+02	--	--	na	3.7E+03	--	--	--	--	--	--	--	--	--	--	na	3.7E+03
Fluorene	0	--	--	na	1.4E+04	--	--	na	1.4E+05	--	--	--	--	--	--	--	--	--	--	na	1.4E+05
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	1.0E-01	na	--
Heptachlor <sup>C</sup>	0	5.2E-01	3.8E-03	na	2.1E-03	5.2E+00	3.8E-02	na	2.1E-02	--	--	--	--	--	--	--	--	5.2E+00	3.8E-02	na	2.1E-02
Heptachlor Epoxide <sup>C</sup>	0	5.2E-01	3.8E-03	na	1.1E-03	5.2E+00	3.8E-02	na	1.1E-02	--	--	--	--	--	--	--	--	5.2E+00	3.8E-02	na	1.1E-02
Hexachlorobenzene <sup>C</sup>	0	--	--	na	7.7E-03	--	--	na	7.7E-02	--	--	--	--	--	--	--	--	--	--	na	7.7E-02
Hexachlorobutadiene <sup>C</sup>	0	--	--	na	5.0E+02	--	--	na	5.0E+03	--	--	--	--	--	--	--	--	--	--	na	5.0E+03
Hexachlorocyclohexane Alpha-BHC <sup>C</sup>	0	--	--	na	1.3E-01	--	--	na	1.3E+00	--	--	--	--	--	--	--	--	--	--	na	1.3E+00
Hexachlorocyclohexane Beta-BHC <sup>C</sup>	0	--	--	na	4.6E-01	--	--	na	4.6E+00	--	--	--	--	--	--	--	--	--	--	na	4.6E+00
Hexachlorocyclohexane Gamma-BHC <sup>C</sup> (Lindane)	0	9.5E-01	na	na	6.3E-01	9.5E+00	--	na	6.3E+00	--	--	--	--	--	--	--	--	9.5E+00	--	na	6.3E+00
Hexachlorocyclopentadiene	0	--	--	na	1.7E+04	--	--	na	1.7E+05	--	--	--	--	--	--	--	--	--	--	na	1.7E+05
Hexachloroethane <sup>C</sup>	0	--	--	na	8.9E+01	--	--	na	8.9E+02	--	--	--	--	--	--	--	--	--	--	na	8.9E+02
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+01	na	--	--	--	--	--	--	--	--	--	--	2.0E+01	na	--
Indeno (1,2,3-cd) pyrene <sup>C</sup>	0	--	--	na	4.9E-01	--	--	na	4.9E+00	--	--	--	--	--	--	--	--	--	--	na	4.9E+00
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone <sup>C</sup>	0	--	--	na	2.6E+04	--	--	na	2.6E+05	--	--	--	--	--	--	--	--	--	--	na	2.6E+05
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	4.9E+01	5.6E+00	na	--	4.9E+02	5.6E+01	na	--	--	--	--	--	--	--	--	--	4.9E+02	5.6E+01	na	--
Malathion	0	--	1.0E-01	na	--	--	1.0E+00	na	--	--	--	--	--	--	--	--	--	--	1.0E+00	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	na	5.1E-02	1.4E+01	7.7E+00	na	5.1E-01	--	--	--	--	--	--	--	--	1.4E+01	7.7E+00	na	5.1E-01
Methyl Bromide	0	--	--	na	4.0E+03	--	--	na	4.0E+04	--	--	--	--	--	--	--	--	--	--	na	4.0E+04
Methoxychlor	0	--	3.0E-02	na	--	--	3.0E-01	na	--	--	--	--	--	--	--	--	--	--	3.0E-01	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Monochlorobenzene	0	--	--	na	2.1E+04	--	--	na	2.1E+05	--	--	--	--	--	--	--	--	--	--	na	2.1E+05
Nickel	0	1.0E+02	1.1E+01	na	4.6E+03	1.0E+03	1.1E+02	na	4.6E+04	--	--	--	--	--	--	--	--	1.0E+03	1.1E+02	na	4.6E+04
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	1.9E+03	--	--	na	1.9E+04	--	--	--	--	--	--	--	--	--	--	na	1.9E+04
N-Nitrosodimethylamine <sup>C</sup>	0	--	--	na	8.1E+01	--	--	na	8.1E+02	--	--	--	--	--	--	--	--	--	--	na	8.1E+02
N-Nitrosodiphenylamine <sup>C</sup>	0	--	--	na	1.6E+02	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	--	--	na	1.6E+03
N-Nitrosodi-n-propylamine <sup>C</sup>	0	--	--	na	1.4E+01	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	--	--	na	1.4E+02
Parathion	0	6.5E-02	1.3E-02	na	--	6.5E-01	1.3E-01	na	--	--	--	--	--	--	--	--	--	6.5E-01	1.3E-01	na	--
PCB-1016	0	--	1.4E-02	na	--	--	1.4E-01	na	--	--	--	--	--	--	--	--	--	--	1.4E-01	na	--
PCB-1221	0	--	1.4E-02	na	--	--	1.4E-01	na	--	--	--	--	--	--	--	--	--	--	1.4E-01	na	--
PCB-1232	0	--	1.4E-02	na	--	--	1.4E-01	na	--	--	--	--	--	--	--	--	--	--	1.4E-01	na	--
PCB-1242	0	--	1.4E-02	na	--	--	1.4E-01	na	--	--	--	--	--	--	--	--	--	--	1.4E-01	na	--
PCB-1248	0	--	1.4E-02	na	--	--	1.4E-01	na	--	--	--	--	--	--	--	--	--	--	1.4E-01	na	--
PCB-1254	0	--	1.4E-02	na	--	--	1.4E-01	na	--	--	--	--	--	--	--	--	--	--	1.4E-01	na	--
PCB-1260	0	--	1.4E-02	na	--	--	1.4E-01	na	--	--	--	--	--	--	--	--	--	--	1.4E-01	na	--
PCB Total <sup>C</sup>	0	--	--	na	1.7E-03	--	--	na	1.7E-02	--	--	--	--	--	--	--	--	--	--	na	1.7E-02

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Pentachlorophenol <sup>C</sup>	0	7.7E-03	5.9E-03	na	8.2E+01	7.7E-02	5.9E-02	na	8.2E+02	--	--	--	--	--	--	--	--	7.7E-02	5.9E-02	na	8.2E+02
Phenol	0	--	--	na	4.6E+06	--	--	na	4.6E+07	--	--	--	--	--	--	--	--	--	--	na	4.6E+07
Pyrene	0	--	--	na	1.1E+04	--	--	na	1.1E+05	--	--	--	--	--	--	--	--	--	--	na	1.1E+05
Radionuclides (pCi/l except Beta/Photon)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity Beta and Photon Activity (mrem/yr)	0	--	--	na	1.5E+01	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	na	1.5E+02
Strontium-90	0	--	--	na	8.0E+00	--	--	na	8.0E+01	--	--	--	--	--	--	--	--	--	--	na	8.0E+01
Tritium	0	--	--	na	2.0E+04	--	--	na	2.0E+05	--	--	--	--	--	--	--	--	--	--	na	2.0E+05
Selenium	0	2.0E+01	5.0E+00	na	1.1E+04	2.0E+02	5.0E+01	na	1.1E+05	--	--	--	--	--	--	--	--	2.0E+02	5.0E+01	na	1.1E+05
Silver	0	1.0E+00	--	na	--	1.0E+01	--	na	--	--	--	--	--	--	--	--	--	1.0E+01	--	na	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,1,2,2-Tetrachloroethane <sup>C</sup>	0	--	--	na	1.1E+02	--	--	na	1.1E+03	--	--	--	--	--	--	--	--	--	--	na	1.1E+03
Tetrachloroethylene <sup>C</sup>	0	--	--	na	8.9E+01	--	--	na	8.9E+02	--	--	--	--	--	--	--	--	--	--	na	8.9E+02
Thallium	0	--	--	na	6.3E+00	--	--	na	6.3E+01	--	--	--	--	--	--	--	--	--	--	na	6.3E+01
Toluene	0	--	--	na	2.0E+05	--	--	na	2.0E+06	--	--	--	--	--	--	--	--	--	--	na	2.0E+06
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Toxaphene <sup>C</sup>	0	7.3E-01	2.0E-04	na	7.5E-03	7.3E+00	2.0E-03	na	7.5E-02	--	--	--	--	--	--	--	--	7.3E+00	2.0E-03	na	7.5E-02
Tributyltin	0	4.6E-01	6.3E-02	na	--	4.6E+00	6.3E-01	na	--	--	--	--	--	--	--	--	--	4.6E+00	6.3E-01	na	--
1,2,4-Trichlorobenzene	0	--	--	na	9.4E+02	--	--	na	9.4E+03	--	--	--	--	--	--	--	--	--	--	na	9.4E+03
1,1,2-Trichloroethane <sup>C</sup>	0	--	--	na	4.2E+02	--	--	na	4.2E+03	--	--	--	--	--	--	--	--	--	--	na	4.2E+03
Trichloroethylene <sup>C</sup>	0	--	--	na	8.1E+02	--	--	na	8.1E+03	--	--	--	--	--	--	--	--	--	--	na	8.1E+03
2,4,6-Trichlorophenol <sup>C</sup>	0	--	--	na	6.5E+01	--	--	na	6.5E+02	--	--	--	--	--	--	--	--	--	--	na	6.5E+02
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Vinyl Chloride <sup>C</sup>	0	--	--	na	6.1E+01	--	--	na	6.1E+02	--	--	--	--	--	--	--	--	--	--	na	6.1E+02
Zinc	0	6.5E+01	6.6E+01	na	6.9E+04	6.5E+02	6.6E+02	na	6.9E+05	--	--	--	--	--	--	--	--	6.5E+02	6.6E+02	na	6.9E+05

Notes:

- All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
- Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
- Metals measured as Dissolved, unless specified otherwise
- "C" indicates a carcinogenic parameter
- Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.  
Antidegradation WLAs are based upon a complete mix.
- Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic  
= (0.1(WQC - background conc.) + background conc.) for human health
- WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens, Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Mixing ratios may be substituted for stream flows where appropriate.

Metal	Target Value (SSTV)
Antimony	4.3E+04
Arsenic	9.0E+02
Barium	na
Cadmium	3.9E+00
Chromium III	2.5E+02
Chromium VI	6.4E+01
Copper	2.8E+01
Iron	na
Lead	3.4E+01
Manganese	na
Mercury	5.1E-01
Nickel	6.8E+01
Selenium	3.0E+01
Silver	4.2E+00
Zinc	2.6E+02

Note: do not use QL's lower than the minimum QL's provided in agency guidance

### 1.000 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGD) 1.000					<b>Ammonia - Dry Season - Acute</b>		<b>Ammonia - Dry Season - Chronic</b>	
<u>Stream Flows</u>		<u>Total Mix Flows</u>			90th Percentile pH (SU)	1.000	90th Percentile Temp. (deg C)	22.500
<u>Allocated to Mix (MGD)</u>		<u>Stream + Discharge (MGD)</u>			(7.204 - pH)	6.204	90th Percentile pH (SU)	1.000
	<u>Dry Season</u>	<u>Wet Season</u>	<u>Dry Season</u>	<u>Wet Season</u>	(pH - 7.204)	-6.204	MIN	1.704
1Q10	9.000	9.000	10.000	10.000			MAX	22.500
7Q10	9.000	N/A	10.000	N/A	Trout Present Criterion (mg N/l)	39.000	(7.688 - pH)	6.688
30Q10	9.000	9.000	10.000	10.000	Trout Absent Criterion (mg N/L)	58.400	(pH - 7.688)	-6.688
30Q5	9.000	N/A	10.000	N/A	Trout Present?	n	Early LS Present Criterion (mg N)	4.237
Harm. Mean	9.000	N/A	10.000	N/A	Effective Criterion (mg N/L)	58.400	Early LS Absent Criterion (mg N/	4.237
Annual Avg.	na	N/A	#VALUE!	N/A			Early Life Stages Present?	y
							Effective Criterion (mg N/L)	4.237
<u>Stream/Discharge Mix Values</u>					<b>Ammonia - Wet Season - Acute</b>		<b>Ammonia - Wet Season - Chronic</b>	
			<u>Dry Season</u>	<u>Wet Season</u>	90th Percentile pH (SU)	1.000	90th Percentile Temp. (deg C)	13.500
1Q10 90th% Temp. Mix (deg C)			22.500	13.500	(7.204 - pH)	6.204	90th Percentile pH (SU)	1.000
30Q10 90th% Temp. Mix (deg C)			22.500	13.500	(pH - 7.204)	-6.204	MIN	2.850
1Q10 90th% pH Mix (SU)			1.000	1.000			MAX	13.500
30Q10 90th% pH Mix (SU)			1.000	1.000	Trout Present Criterion (mg N/l)	39.000	(7.688 - pH)	6.688
1Q10 10th% pH Mix (SU)			0.000	N/A	Trout Absent Criterion (mg N/L)	58.400	(pH - 7.688)	-6.688
7Q10 10th% pH Mix (SU)			0.000	N/A	Trout Present?	n	Early LS Present Criterion (mg N)	7.088
					Effective Criterion (mg N/L)	58.400	Early LS Absent Criterion (mg N/	7.569
			<u>Calculated</u>	<u>Formula Inputs</u>			Early Life Stages Present?	y
1Q10 Hardness (mg/L as CaCO3)			50.0	50.0			Effective Criterion (mg N/L)	7.088
7Q10 Hardness (mg/L as CaCO3)			50.0	50.0				

### 1.000 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGD) 1.000					<b>Ammonia - Dry Season - Acute</b>		<b>Ammonia - Dry Season - Chronic</b>	
<u>100% Stream Flows</u>		<u>Total Mix Flows</u>			90th Percentile pH (SU)	1.000	90th Percentile Temp. (deg C)	22.500
<u>Allocated to Mix (MGD)</u>		<u>Stream + Discharge (MGD)</u>			(7.204 - pH)	6.204	90th Percentile pH (SU)	1.000
	<u>Dry Season</u>	<u>Wet Season</u>	<u>Dry Season</u>	<u>Wet Season</u>	(pH - 7.204)	-6.204	MIN	1.704
1Q10	9.000	9.000	10.000	10.000			MAX	22.500
7Q10	9.000	N/A	10.000	N/A	Trout Present Criterion (mg N/l)	39.000	(7.688 - pH)	6.688
30Q10	9.000	9.000	10.000	10.000	Trout Absent Criterion (mg N/L)	58.400	(pH - 7.688)	-6.688
30Q5	9.000	N/A	10.000	N/A	Trout Present?	n	Early LS Present Criterion (mg N)	4.237
Harm. Mean	9.000	N/A	10.000	N/A	Effective Criterion (mg N/L)	58.400	Early LS Absent Criterion (mg N/	4.237
Annual Avg.	na	N/A	#VALUE!	N/A			Early Life Stages Present?	y
							Effective Criterion (mg N/L)	4.237
<u>Stream/Discharge Mix Values</u>					<b>Ammonia - Wet Season - Acute</b>		<b>Ammonia - Wet Season - Chronic</b>	
			<u>Dry Season</u>	<u>Wet Season</u>	90th Percentile pH (SU)	1.000	90th Percentile Temp. (deg C)	13.500
1Q10 90th% Temp. Mix (deg C)			22.500	13.500	(7.204 - pH)	6.204	90th Percentile pH (SU)	1.000
30Q10 90th% Temp. Mix (deg C)			22.500	13.500	(pH - 7.204)	-6.204	MIN	2.850
1Q10 90th% pH Mix (SU)			1.000	1.000			MAX	13.500
30Q10 90th% pH Mix (SU)			1.000	1.000	Trout Present Criterion (mg N/l)	39.000	(7.688 - pH)	6.688
1Q10 10th% pH Mix (SU)			0.000	N/A	Trout Absent Criterion (mg N/L)	58.400	(pH - 7.688)	-6.688
7Q10 10th% pH Mix (SU)			0.000	N/A	Trout Present?	n	Early LS Present Criterion (mg N)	7.088
					Effective Criterion (mg N/L)	58.400	Early LS Absent Criterion (mg N/	7.569
			<u>Calculated</u>	<u>Formula Inputs</u>			Early Life Stages Present?	y
1Q10 Hardness (mg/L as CaCO3) =			50.000	50.000			Effective Criterion (mg N/L)	7.088
7Q10 Hardness (mg/L as CaCO3) =			50.000	50.000				

# FRESHWATER WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Quantico Mainside WWTP

Permit No.: VA0028363

Receiving Stream: UT to Quantico Bight

Version: OWP Guidance Memo 00-2011 (8/24/00)

## Stream Information

Mean Hardness (as CaCO<sub>3</sub>) = 50 mg/L  
 90% Temperature (Annual) = 25 deg C  
 90% Temperature (Wet season) = 15 deg C  
 90% Maximum pH = 7.7 SU  
 10% Maximum pH = SU  
 Tier Designation (1 or 2) = 1  
 Public Water Supply (PWS) Y/N? = n  
 Trout Present Y/N? = n  
 Early Life Stages Present Y/N? = y

## Stream Flows

1Q10 (Annual) = 49 MGD  
 7Q10 (Annual) = 49 MGD  
 30Q10 (Annual) = 49 MGD  
 1Q10 (Wet season) = 49 MGD  
 30Q10 (Wet season) = 49 MGD  
 30Q5 = 49 MGD  
 Harmonic Mean = 49 MGD  
 Annual Average = na MGD

## Mixing Information

Annual - 1Q10 Mix = 100 %  
 - 7Q10 Mix = 100 %  
 - 30Q10 Mix = 100 %  
 Wet Season - 1Q10 Mix = 100 %  
 - 30Q10 Mix = 100 %

## Effluent Information

Mean Hardness (as CaCO<sub>3</sub>) = 50 mg/L  
 90% Temp (Annual) = deg C  
 90% Temp (Wet season) = deg C  
 90% Maximum pH = SU  
 10% Maximum pH = SU  
 Discharge Flow = 1 MGD

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenaphthene	0	--	--	na	2.7E+03	--	--	na	1.4E+05	--	--	--	--	--	--	--	--	--	--	na	1.4E+05
Acrolein	0	--	--	na	7.8E+02	--	--	na	3.9E+04	--	--	--	--	--	--	--	--	--	--	na	3.9E+04
Acrylonitrile <sup>c</sup>	0	--	--	na	6.6E+00	--	--	na	3.3E+02	--	--	--	--	--	--	--	--	--	--	na	3.3E+02
Aldrin <sup>c</sup>	0	3.0E+00	--	na	1.4E-03	1.5E+02	--	na	7.0E-02	--	--	--	--	--	--	--	--	1.5E+02	--	na	7.0E-02
Ammonia-N (mg/l) (Yearly)	0	5.84E+01	3.72E+00	na	--	2.9E+03	1.9E+02	na	--	--	--	--	--	--	--	--	--	2.9E+03	1.9E+02	na	--
Ammonia-N (mg/l) (High Flow)	0	5.84E+01	7.01E+00	na	--	2.9E+03	3.5E+02	na	--	--	--	--	--	--	--	--	--	2.9E+03	3.5E+02	na	--
Anthracene	0	--	--	na	1.1E+05	--	--	na	5.5E+06	--	--	--	--	--	--	--	--	--	--	na	5.5E+06
Antimony	0	--	--	na	4.3E+03	--	--	na	2.2E+05	--	--	--	--	--	--	--	--	--	--	na	2.2E+05
Arsenic	0	3.4E+02	1.5E+02	na	--	1.7E+04	7.5E+03	na	--	--	--	--	--	--	--	--	--	1.7E+04	7.5E+03	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene <sup>c</sup>	0	--	--	na	7.1E+02	--	--	na	3.6E+04	--	--	--	--	--	--	--	--	--	--	na	3.6E+04
Benzidine <sup>c</sup>	0	--	--	na	5.4E-03	--	--	na	2.7E-01	--	--	--	--	--	--	--	--	--	--	na	2.7E-01
Benzo (a) anthracene <sup>c</sup>	0	--	--	na	4.9E-01	--	--	na	2.5E+01	--	--	--	--	--	--	--	--	--	--	na	2.5E+01
Benzo (b) fluoranthene <sup>c</sup>	0	--	--	na	4.9E-01	--	--	na	2.5E+01	--	--	--	--	--	--	--	--	--	--	na	2.5E+01
Benzo (k) fluoranthene <sup>c</sup>	0	--	--	na	4.9E-01	--	--	na	2.5E+01	--	--	--	--	--	--	--	--	--	--	na	2.5E+01
Benzo (a) pyrene <sup>c</sup>	0	--	--	na	4.9E-01	--	--	na	2.5E+01	--	--	--	--	--	--	--	--	--	--	na	2.5E+01
Bis2-Chloroethyl Ether	0	--	--	na	1.4E+01	--	--	na	7.0E+02	--	--	--	--	--	--	--	--	--	--	na	7.0E+02
Bis2-Chloroisopropyl Ether	0	--	--	na	1.7E+05	--	--	na	8.5E+06	--	--	--	--	--	--	--	--	--	--	na	8.5E+06
Bromoform <sup>c</sup>	0	--	--	na	3.6E+03	--	--	na	1.8E+05	--	--	--	--	--	--	--	--	--	--	na	1.8E+05
Butylbenzylphthalate	0	--	--	na	5.2E+03	--	--	na	2.6E+05	--	--	--	--	--	--	--	--	--	--	na	2.6E+05
Cadmium	0	1.8E+00	6.6E-01	na	--	9.0E+01	3.3E+01	na	--	--	--	--	--	--	--	--	--	9.0E+01	3.3E+01	na	--
Carbon Tetrachloride <sup>c</sup>	0	--	--	na	4.4E+01	--	--	na	2.2E+03	--	--	--	--	--	--	--	--	--	--	na	2.2E+03
Chlordane <sup>c</sup>	0	2.4E+00	4.3E-03	na	2.2E-02	1.2E+02	2.2E-01	na	1.1E+00	--	--	--	--	--	--	--	--	1.2E+02	2.2E-01	na	1.1E+00
Chloride	0	8.6E+05	2.3E+05	na	--	4.3E+07	1.2E+07	na	--	--	--	--	--	--	--	--	--	4.3E+07	1.2E+07	na	--
TRC	0	1.9E+01	1.1E+01	na	--	9.5E+02	5.5E+02	na	--	--	--	--	--	--	--	--	--	9.5E+02	5.5E+02	na	--
Chlorobenzene	0	--	--	na	2.1E+04	--	--	na	1.1E+06	--	--	--	--	--	--	--	--	--	--	na	1.1E+06

Chronic WLA Calculation 50:1 Dilution

Stream Flows & Discharge Flows are not actual values.

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane <sup>C</sup>	0	--	--	na	3.4E+02	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	--	--	na	1.7E+04
Chloroform <sup>C</sup>	0	--	--	na	2.9E+04	--	--	na	1.5E+06	--	--	--	--	--	--	--	--	--	--	na	1.5E+06
2-Chloronaphthalene	0	--	--	na	4.3E+03	--	--	na	2.2E+05	--	--	--	--	--	--	--	--	--	--	na	2.2E+05
2-Chlorophenol	0	--	--	na	4.0E+02	--	--	na	2.0E+04	--	--	--	--	--	--	--	--	--	--	na	2.0E+04
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	4.2E+00	2.1E+00	na	--	--	--	--	--	--	--	--	--	4.2E+00	2.1E+00	na	--
Chromium III	0	3.2E+02	4.2E+01	na	--	1.6E+04	2.1E+03	na	--	--	--	--	--	--	--	--	--	1.6E+04	2.1E+03	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	8.0E+02	5.5E+02	na	--	--	--	--	--	--	--	--	--	8.0E+02	5.5E+02	na	--
Chromium, Total	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene <sup>C</sup>	0	--	--	na	4.9E-01	--	--	na	2.5E+01	--	--	--	--	--	--	--	--	--	--	na	2.5E+01
Copper	0	7.0E+00	5.0E+00	na	--	3.5E+02	2.5E+02	na	--	--	--	--	--	--	--	--	--	3.5E+02	2.5E+02	na	--
Cyanide	0	2.2E+01	5.2E+00	na	2.2E+05	1.1E+03	2.6E+02	na	1.1E+07	--	--	--	--	--	--	--	--	1.1E+03	2.6E+02	na	1.1E+07
DDD <sup>C</sup>	0	--	--	na	8.4E-03	--	--	na	4.2E-01	--	--	--	--	--	--	--	--	--	--	na	4.2E-01
DDE <sup>C</sup>	0	--	--	na	5.9E-03	--	--	na	3.0E-01	--	--	--	--	--	--	--	--	--	--	na	3.0E-01
DDT <sup>C</sup>	0	1.1E+00	1.0E-03	na	5.9E-03	5.5E+01	5.0E-02	na	3.0E-01	--	--	--	--	--	--	--	--	5.5E+01	5.0E-02	na	3.0E-01
Demeton	0	--	1.0E-01	na	--	--	5.0E+00	na	--	--	--	--	--	--	--	--	--	--	5.0E+00	na	--
Dibenz(a,h)anthracene <sup>C</sup>	0	--	--	na	4.9E-01	--	--	na	2.5E+01	--	--	--	--	--	--	--	--	--	--	na	2.5E+01
Dibutyl phthalate	0	--	--	na	1.2E+04	--	--	na	6.0E+05	--	--	--	--	--	--	--	--	--	--	na	6.0E+05
Dichloromethane (Methylene Chloride) <sup>C</sup>	0	--	--	na	1.6E+04	--	--	na	8.0E+05	--	--	--	--	--	--	--	--	--	--	na	8.0E+05
1,2-Dichlorobenzene	0	--	--	na	1.7E+04	--	--	na	8.5E+05	--	--	--	--	--	--	--	--	--	--	na	8.5E+05
1,3-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	1.3E+05	--	--	--	--	--	--	--	--	--	--	na	1.3E+05
1,4-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	1.3E+05	--	--	--	--	--	--	--	--	--	--	na	1.3E+05
3,3-Dichlorobenzidine <sup>C</sup>	0	--	--	na	7.7E-01	--	--	na	3.9E+01	--	--	--	--	--	--	--	--	--	--	na	3.9E+01
Dichlorobromomethane <sup>C</sup>	0	--	--	na	4.6E+02	--	--	na	2.3E+04	--	--	--	--	--	--	--	--	--	--	na	2.3E+04
1,2-Dichloroethane <sup>C</sup>	0	--	--	na	9.9E+02	--	--	na	5.0E+04	--	--	--	--	--	--	--	--	--	--	na	5.0E+04
1,1-Dichloroethylene	0	--	--	na	1.7E+04	--	--	na	8.5E+05	--	--	--	--	--	--	--	--	--	--	na	8.5E+05
1,2-trans-dichloroethylene	0	--	--	na	1.4E+05	--	--	na	7.0E+06	--	--	--	--	--	--	--	--	--	--	na	7.0E+06
2,4-Dichlorophenol	0	--	--	na	7.9E+02	--	--	na	4.0E+04	--	--	--	--	--	--	--	--	--	--	na	4.0E+04
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane <sup>C</sup>	0	--	--	na	3.9E+02	--	--	na	2.0E+04	--	--	--	--	--	--	--	--	--	--	na	2.0E+04
1,3-Dichloropropene	0	--	--	na	1.7E+03	--	--	na	8.5E+04	--	--	--	--	--	--	--	--	--	--	na	8.5E+04
Dieldrin <sup>C</sup>	0	2.4E-01	5.6E-02	na	1.4E-03	1.2E+01	2.8E+00	na	7.0E-02	--	--	--	--	--	--	--	--	1.2E+01	2.8E+00	na	7.0E-02
Diethyl Phthalate	0	--	--	na	1.2E+05	--	--	na	6.0E+06	--	--	--	--	--	--	--	--	--	--	na	6.0E+06
Di-2-Ethylhexyl Phthalate <sup>C</sup>	0	--	--	na	5.9E+01	--	--	na	3.0E+03	--	--	--	--	--	--	--	--	--	--	na	3.0E+03
2,4-Dimethylphenol	0	--	--	na	2.3E+03	--	--	na	1.2E+05	--	--	--	--	--	--	--	--	--	--	na	1.2E+05
Dimethyl Phthalate	0	--	--	na	2.9E+06	--	--	na	1.5E+08	--	--	--	--	--	--	--	--	--	--	na	1.5E+08
Di-n-Butyl Phthalate	0	--	--	na	1.2E+04	--	--	na	6.0E+05	--	--	--	--	--	--	--	--	--	--	na	6.0E+05
2,4 Dinitrophenol	0	--	--	na	1.4E+04	--	--	na	7.0E+05	--	--	--	--	--	--	--	--	--	--	na	7.0E+05
2-Methyl-4,6-Dinitrophenol	0	--	--	na	7.65E+02	--	--	na	3.8E+04	--	--	--	--	--	--	--	--	--	--	na	3.8E+04
2,4-Dinitrotoluene <sup>C</sup>	0	--	--	na	9.1E+01	--	--	na	4.6E+03	--	--	--	--	--	--	--	--	--	--	na	4.6E+03
Dioxin (2,3,7,8- tetrachlorodibenzo-p-dioxin) (ppq)	0	--	--	na	1.2E-06	--	--	na	na	--	--	--	--	--	--	--	--	--	--	na	na
1,2-Diphenylhydrazine <sup>C</sup>	0	--	--	na	5.4E+00	--	--	na	2.7E+02	--	--	--	--	--	--	--	--	--	--	na	2.7E+02
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	1.1E+01	2.8E+00	na	1.2E+04	--	--	--	--	--	--	--	--	1.1E+01	2.8E+00	na	1.2E+04
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	1.1E+01	2.8E+00	na	1.2E+04	--	--	--	--	--	--	--	--	1.1E+01	2.8E+00	na	1.2E+04
Endosulfan Sulfate	0	--	--	na	2.4E+02	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	--	--	na	1.2E+04
Endrin	0	8.6E-02	3.6E-02	na	8.1E-01	4.3E+00	1.8E+00	na	4.1E+01	--	--	--	--	--	--	--	--	4.3E+00	1.8E+00	na	4.1E+01
Endrin Aldehyde	0	--	--	na	8.1E-01	--	--	na	4.1E+01	--	--	--	--	--	--	--	--	--	--	na	4.1E+01

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.9E+04	--	--	na	1.5E+06	--	--	--	--	--	--	--	--	--	--	na	1.5E+06
Fluoranthene	0	--	--	na	3.7E+02	--	--	na	1.9E+04	--	--	--	--	--	--	--	--	--	--	na	1.9E+04
Fluorene	0	--	--	na	1.4E+04	--	--	na	7.0E+05	--	--	--	--	--	--	--	--	--	--	na	7.0E+05
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	5.0E-01	na	--	--	--	--	--	--	--	--	--	--	5.0E-01	na	--
Heptachlor <sup>C</sup>	0	5.2E-01	3.8E-03	na	2.1E-03	2.6E+01	1.9E-01	na	1.1E-01	--	--	--	--	--	--	--	--	2.6E+01	1.9E-01	na	1.1E-01
Heptachlor Epoxide <sup>C</sup>	0	5.2E-01	3.8E-03	na	1.1E-03	2.6E+01	1.9E-01	na	5.5E-02	--	--	--	--	--	--	--	--	2.6E+01	1.9E-01	na	5.5E-02
Hexachlorobenzene <sup>C</sup>	0	--	--	na	7.7E-03	--	--	na	3.9E-01	--	--	--	--	--	3.9E-01	--	--	--	--	na	3.9E-01
Hexachlorobutadiene <sup>C</sup>	0	--	--	na	5.0E+02	--	--	na	2.5E+04	--	--	--	--	--	2.5E+04	--	--	--	--	na	2.5E+04
Hexachlorocyclohexane Alpha-BHC <sup>C</sup>	0	--	--	na	1.3E-01	--	--	na	6.5E+00	--	--	--	--	--	--	--	--	--	--	na	6.5E+00
Hexachlorocyclohexane Beta-BHC <sup>C</sup>	0	--	--	na	4.6E-01	--	--	na	2.3E+01	--	--	--	--	--	--	--	--	--	--	na	2.3E+01
Hexachlorocyclohexane Gamma-BHC <sup>C</sup> (Lindane)	0	9.5E-01	na	na	6.3E-01	4.8E+01	--	na	3.2E+01	--	--	--	--	--	--	--	--	4.8E+01	--	na	3.2E+01
Hexachlorocyclopentadiene	0	--	--	na	1.7E+04	--	--	na	8.5E+05	--	--	--	--	--	--	--	--	--	--	na	8.5E+05
Hexachloroethane <sup>C</sup>	0	--	--	na	8.9E+01	--	--	na	4.5E+03	--	--	--	--	--	--	--	--	--	--	na	4.5E+03
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	1.0E+02	na	--	--	--	--	--	--	--	--	--	--	1.0E+02	na	--
Indeno (1,2,3-cd) pyrene <sup>C</sup>	0	--	--	na	4.9E-01	--	--	na	2.5E+01	--	--	--	--	--	5E+01	--	--	--	--	na	2.5E+01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone <sup>C</sup>	0	--	--	na	2.6E+04	--	--	na	1.3E+06	--	--	--	--	--	--	--	--	--	--	na	1.3E+06
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	4.9E+01	5.6E+00	na	--	2.5E+03	2.8E+02	na	--	--	--	--	--	--	--	--	--	2.5E+03	2.8E+02	na	--
Malathion	0	--	1.0E-01	na	--	--	5.0E+00	na	--	--	--	--	--	--	--	--	--	--	5.0E+00	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	na	5.1E-02	7.0E+01	3.9E+01	na	2.6E+00	--	--	--	--	--	6E+00	--	--	7.0E+01	3.9E+01	na	2.6E+00
Methyl Bromide	0	--	--	na	4.0E+03	--	--	na	2.0E+05	--	--	--	--	--	--	--	--	--	--	na	2.0E+05
Methoxychlor	0	--	3.0E-02	na	--	--	1.5E+00	na	--	--	--	--	--	--	--	--	--	--	1.5E+00	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Monochlorobenzene	0	--	--	na	2.1E+04	--	--	na	1.1E+06	--	--	--	--	--	--	--	--	--	--	na	1.1E+06
Nickel	0	1.0E+02	1.1E+01	na	4.6E+03	5.1E+03	5.6E+02	na	2.3E+05	--	--	--	--	--	--	--	--	5.1E+03	5.6E+02	na	2.3E+05
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	1.9E+03	--	--	na	9.5E+04	--	--	--	--	--	9.5E+04	--	--	--	--	na	9.5E+04
N-Nitrosodimethylamine <sup>C</sup>	0	--	--	na	8.1E+01	--	--	na	4.1E+03	--	--	--	--	--	--	--	--	--	--	na	4.1E+03
N-Nitrosodiphenylamine <sup>C</sup>	0	--	--	na	1.6E+02	--	--	na	8.0E+03	--	--	--	--	--	--	--	--	--	--	na	8.0E+03
N-Nitrosodi-n-propylamine <sup>C</sup>	0	--	--	na	1.4E+01	--	--	na	7.0E+02	--	--	--	--	--	--	--	--	--	--	na	7.0E+02
Parathion	0	6.5E-02	1.3E-02	na	--	3.3E+00	6.5E-01	na	--	--	--	--	--	--	--	--	--	3.3E+00	6.5E-01	na	--
PCB-1016	0	--	1.4E-02	na	--	--	7.0E-01	na	--	--	--	--	--	--	--	--	--	--	7.0E-01	na	--
PCB-1221	0	--	1.4E-02	na	--	--	7.0E-01	na	--	--	--	--	--	--	--	--	--	--	7.0E-01	na	--
PCB-1232	0	--	1.4E-02	na	--	--	7.0E-01	na	--	--	--	--	--	--	--	--	--	--	7.0E-01	na	--
PCB-1242	0	--	1.4E-02	na	--	--	7.0E-01	na	--	--	--	--	--	--	--	--	--	--	7.0E-01	na	--
PCB-1248	0	--	1.4E-02	na	--	--	7.0E-01	na	--	--	--	--	--	--	--	--	--	--	7.0E-01	na	--
PCB-1254	0	--	1.4E-02	na	--	--	7.0E-01	na	--	--	--	--	--	--	--	--	--	--	7.0E-01	na	--
PCB-1260	0	--	1.4E-02	na	--	--	7.0E-01	na	--	--	--	--	--	--	--	--	--	--	7.0E-01	na	--
PCB Total <sup>C</sup>	0	--	--	na	1.7E-03	--	--	na	8.5E-02	--	--	--	--	--	--	--	--	--	--	na	8.5E-02

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Pentachlorophenol <sup>C</sup>	0	7.7E-03	5.9E-03	na	8.2E+01	3.8E-01	2.9E-01	na	4.1E+03	--	--	--	--	--	--	--	--	3.8E-01	2.9E-01	na	4.1E+03
Phenol	0	--	--	na	4.6E+06	--	--	na	2.3E+08	--	--	--	--	--	--	--	--	--	--	na	2.3E+08
Pyrene	0	--	--	na	1.1E+04	--	--	na	5.5E+05	--	--	--	--	--	--	--	--	--	--	na	5.5E+05
Radionuclides (pCi/l except Beta/Photon)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity	0	--	--	na	1.5E+01	--	--	na	7.5E+02	--	--	--	--	--	--	--	--	--	--	na	7.5E+02
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	2.0E+02	--	--	--	--	--	--	--	--	--	--	na	2.0E+02
Strontium-90	0	--	--	na	8.0E+00	--	--	na	4.0E+02	--	--	--	--	--	--	--	--	--	--	na	4.0E+02
Tritium	0	--	--	na	2.0E+04	--	--	na	1.0E+06	--	--	--	--	--	--	--	--	--	--	na	1.0E+06
Selenium	0	2.0E+01	5.0E+00	na	1.1E+04	1.0E+03	2.5E+02	na	5.5E+05	--	--	--	--	--	--	--	--	1.0E+03	2.5E+02	na	5.5E+05
Silver	0	1.0E+00	--	na	--	5.2E+01	--	na	--	--	--	--	--	--	--	--	--	5.2E+01	--	na	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,1,2,2-Tetrachloroethane <sup>C</sup>	0	--	--	na	1.1E+02	--	--	na	5.5E+03	--	--	--	--	--	--	--	--	--	--	na	5.5E+03
Tetrachloroethylene <sup>C</sup>	0	--	--	na	8.9E+01	--	--	na	4.5E+03	--	--	--	--	--	--	--	--	--	--	na	4.5E+03
Thallium	0	--	--	na	6.3E+00	--	--	na	3.2E+02	--	--	--	--	--	--	--	--	--	--	na	3.2E+02
Toluene	0	--	--	na	2.0E+05	--	--	na	1.0E+07	--	--	--	--	--	--	--	--	--	--	na	1.0E+07
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Toxaphene <sup>C</sup>	0	7.3E-01	2.0E-04	na	7.5E-03	3.7E+01	1.0E-02	na	3.8E-01	--	--	--	--	--	--	--	--	3.7E+01	1.0E-02	na	3.8E-01
Tributyltin	0	4.6E-01	6.3E-02	na	--	2.3E+01	3.2E+00	na	--	--	--	--	--	--	--	--	--	2.3E+01	3.2E+00	na	--
1,2,4-Trichlorobenzene	0	--	--	na	9.4E+02	--	--	na	4.7E+04	--	--	--	--	--	--	--	--	--	--	na	4.7E+04
1,1,2-Trichloroethane <sup>C</sup>	0	--	--	na	4.2E+02	--	--	na	2.1E+04	--	--	--	--	--	--	--	--	--	--	na	2.1E+04
Trichloroethylene <sup>C</sup>	0	--	--	na	8.1E+02	--	--	na	4.1E+04	--	--	--	--	--	--	--	--	--	--	na	4.1E+04
2,4,6-Trichlorophenol <sup>C</sup>	0	--	--	na	6.5E+01	--	--	na	3.3E+03	--	--	--	--	--	--	--	--	--	--	na	3.3E+03
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Vinyl Chloride <sup>C</sup>	0	--	--	na	6.1E+01	--	--	na	3.1E+03	--	--	--	--	--	--	--	--	--	--	na	3.1E+03
Zinc	0	6.5E+01	6.6E+01	na	6.9E+04	3.3E+03	3.3E+03	na	3.5E+06	--	--	--	--	--	--	--	--	3.3E+03	3.3E+03	na	3.5E+06

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.  
Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic  
= (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens, Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Mixing ratios may be substituted for stream flows where appropriate.

Metal	Target Value (SSTV)
Antimony	2.2E+05
Arsenic	4.5E+03
Barium	na
Cadmium	2.0E+01
Chromium III	1.3E+03
Chromium VI	3.2E+02
Copper	1.4E+02
Iron	na
Lead	1.7E+02
Manganese	na
Mercury	2.6E+00
Nickel	3.4E+02
Selenium	1.5E+02
Silver	2.1E+01
Zinc	1.3E+03

Note: do not use QL's lower than the minimum QL's provided in agency guidance

### 1.000 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGD) 1.000				<b>Ammonia - Dry Season - Acute</b>		<b>Ammonia - Dry Season - Chronic</b>	
<b>Stream Flows</b>		<b>Total Mix Flows</b>		90th Percentile pH (SU)	1.000	90th Percentile Temp. (deg C)	22.500
<b>Allocated to Mix (MGD)</b>		<b>Stream + Discharge (MGD)</b>		(7.204 - pH)	6.204	90th Percentile pH (SU)	1.000
<b>Dry Season</b>	<b>Wet Season</b>	<b>Dry Season</b>	<b>Wet Season</b>	(pH - 7.204)	-6.204	MIN	1.704
1Q10	9.000	9.000	10.000	Trout Present Criterion (mg N/l)	39.000	MAX	22.500
7Q10	9.000	N/A	10.000	Trout Absent Criterion (mg N/L)	58.400	(7.688 - pH)	6.688
30Q10	9.000	9.000	10.000	Trout Present?	n	(pH - 7.688)	-6.688
30Q5	9.000	N/A	10.000	Effective Criterion (mg N/L)	58.400	Early LS Present Criterion (mg N)	4.237
Harm. Mean	9.000	N/A	10.000			Early LS Absent Criterion (mg N/	4.237
Annual Avg.	na	N/A	#VALUE!			Early Life Stages Present?	y
						Effective Criterion (mg N/L)	4.237
<b>Stream/Discharge Mix Values</b>				<b>Ammonia - Wet Season - Acute</b>		<b>Ammonia - Wet Season - Chronic</b>	
		<b>Dry Season</b>	<b>Wet Season</b>	90th Percentile pH (SU)	1.000	90th Percentile Temp. (deg C)	13.500
1Q10 90th% Temp. Mix (deg C)		22.500	13.500	(7.204 - pH)	6.204	90th Percentile pH (SU)	1.000
30Q10 90th% Temp. Mix (deg C)		22.500	13.500	(pH - 7.204)	-6.204	MIN	2.850
1Q10 90th% pH Mix (SU)		1.000	1.000	Trout Present Criterion (mg N/l)	39.000	MAX	13.500
30Q10 90th% pH Mix (SU)		1.000	1.000	Trout Absent Criterion (mg N/L)	58.400	(7.688 - pH)	6.688
1Q10 10th% pH Mix (SU)		0.000	N/A	Trout Present?	n	(pH - 7.688)	-6.688
7Q10 10th% pH Mix (SU)		0.000	N/A	Effective Criterion (mg N/L)	58.400	Early LS Present Criterion (mg N)	7.088
		<b>Calculated</b>	<b>Formula Inputs</b>			Early LS Absent Criterion (mg N/	7.569
1Q10 Hardness (mg/L as CaCO3)		50.0	50.0			Early Life Stages Present?	y
7Q10 Hardness (mg/L as CaCO3)		50.0	50.0			Effective Criterion (mg N/L)	7.088

### 1.000 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGD) 1.000				<b>Ammonia - Dry Season - Acute</b>		<b>Ammonia - Dry Season - Chronic</b>	
<b>100% Stream Flows</b>		<b>Total Mix Flows</b>		90th Percentile pH (SU)	1.000	90th Percentile Temp. (deg C)	22.500
<b>Allocated to Mix (MGD)</b>		<b>Stream + Discharge (MGD)</b>		(7.204 - pH)	6.204	90th Percentile pH (SU)	1.000
<b>Dry Season</b>	<b>Wet Season</b>	<b>Dry Season</b>	<b>Wet Season</b>	(pH - 7.204)	-6.204	MIN	1.704
1Q10	9.000	9.000	10.000	Trout Present Criterion (mg N/l)	39.000	MAX	22.500
7Q10	9.000	N/A	10.000	Trout Absent Criterion (mg N/L)	58.400	(7.688 - pH)	6.688
30Q10	9.000	9.000	10.000	Trout Present?	n	(pH - 7.688)	-6.688
30Q5	9.000	N/A	10.000	Effective Criterion (mg N/L)	58.400	Early LS Present Criterion (mg N)	4.237
Harm. Mean	9.000	N/A	10.000			Early LS Absent Criterion (mg N/	4.237
Annual Avg.	na	N/A	#VALUE!			Early Life Stages Present?	y
						Effective Criterion (mg N/L)	4.237
<b>Stream/Discharge Mix Values</b>				<b>Ammonia - Wet Season - Acute</b>		<b>Ammonia - Wet Season - Chronic</b>	
		<b>Dry Season</b>	<b>Wet Season</b>	90th Percentile pH (SU)	1.000	90th Percentile Temp. (deg C)	13.500
1Q10 90th% Temp. Mix (deg C)		22.500	13.500	(7.204 - pH)	6.204	90th Percentile pH (SU)	1.000
30Q10 90th% Temp. Mix (deg C)		22.500	13.500	(pH - 7.204)	-6.204	MIN	2.850
1Q10 90th% pH Mix (SU)		1.000	1.000	Trout Present Criterion (mg N/l)	39.000	MAX	13.500
30Q10 90th% pH Mix (SU)		1.000	1.000	Trout Absent Criterion (mg N/L)	58.400	(7.688 - pH)	6.688
1Q10 10th% pH Mix (SU)		0.000	N/A	Trout Present?	n	(pH - 7.688)	-6.688
7Q10 10th% pH Mix (SU)		0.000	N/A	Effective Criterion (mg N/L)	58.400	Early LS Present Criterion (mg N)	7.088
		<b>Calculated</b>	<b>Formula Inputs</b>			Early LS Absent Criterion (mg N/	7.569
1Q10 Hardness (mg/L as CaCO3) =		50.000	50.000			Early Life Stages Present?	y
7Q10 Hardness (mg/L as CaCO3) =		50.000	50.000			Effective Criterion (mg N/L)	7.088

Quantico Mainside -- Annual Total Recoverable Zinc DMR Data

**Permit #:VA0028363**

Due	Rec'd	Parameter Description	CONC AVG	CONC MAX
10-Jan-2004	12-Jan-2004	ZINC, TOTAL RECOVERABLE	0.017	0.017
10-Jan-2005	10-Jan-2005	ZINC, TOTAL RECOVERABLE	<0.005	<0.005
10-Jan-2006	09-Jan-2006	ZINC, TOTAL RECOVERABLE	0.018	0.018
10-Jan-2007	10-Jan-2007	ZINC, TOTAL RECOVERABLE	0.029	0.029

## **Technical Memorandum**

# **Mainside Sewage Treatment Plant Mixing Zone Study**

**Marine Corps Base, Quantico  
Virginia**

### **Prepared for:**

**Naval Facilities Engineering Command  
Engineering Field Activity Chesapeake**

**Contract No. N62477-98-D-0010**

**Delivery Order No. 0012**

**Engineer In Charge: Amy Baker**

### **Prepared by:**

**AH Environmental Consultants/Montgomery Watson**

**October 2000**

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## **1.0 Introduction**

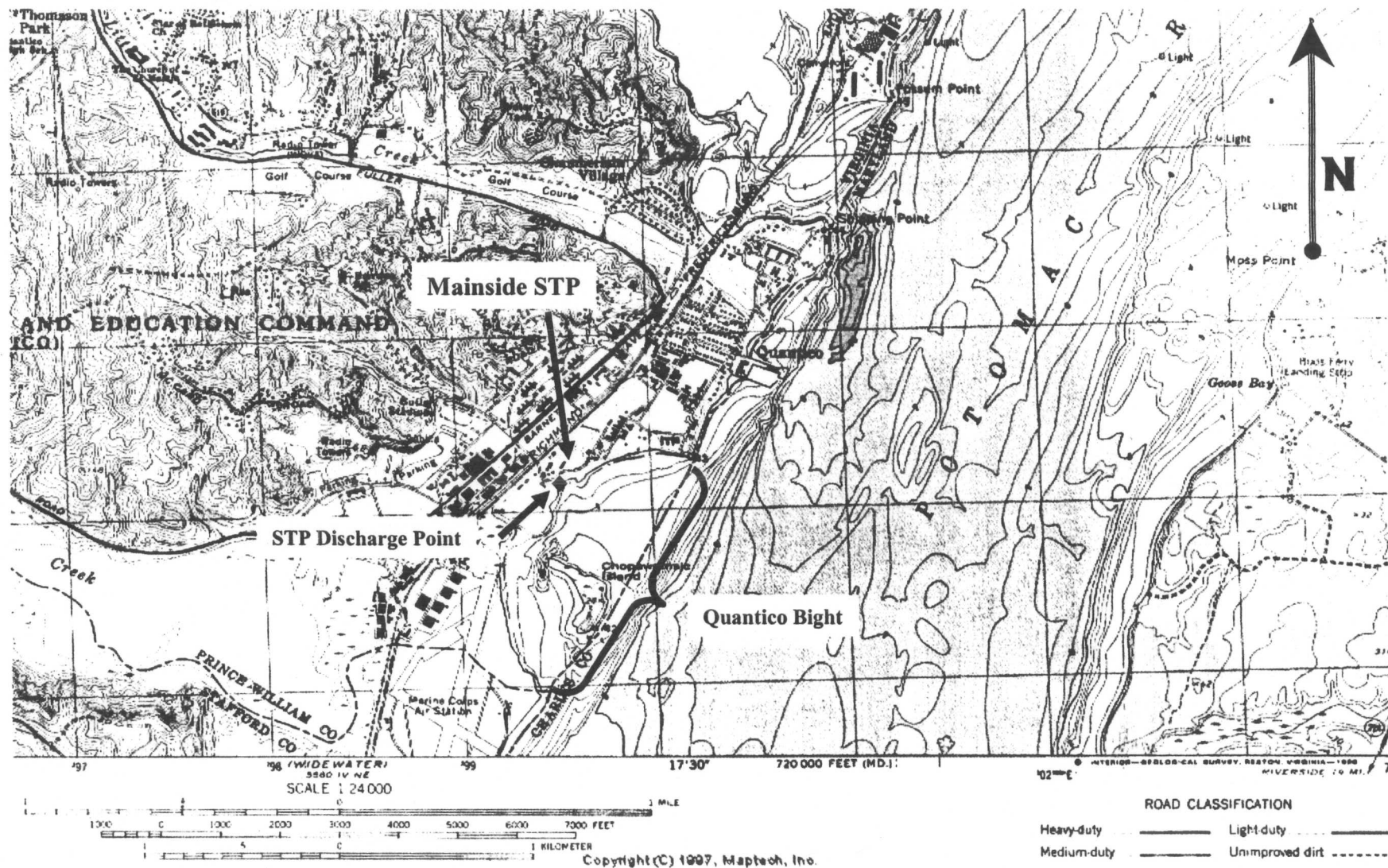
AH Environmental Consultants (AH), Inc. and Montgomery Watson (MW) were contracted by Engineering Field Activity, Chesapeake (EFACHES) to conduct a Mixing Zone Study (MZS) for the Marine Corps Base, Quantico, Virginia (MCB, Quantico). The purpose of this MZS is to investigate the dilution capacity of the Quantico Bight, an embayment on the Potomac River (see Figure 1).

MCB, Quantico owns and operates an advanced wastewater treatment facility referred to as the Mainside Sewage Treatment Plant (Mainside STP or Mainside). MCB, Quantico is completing significant upgrades to Mainside STP. The upgrades to Mainside STP will allow an increase in a rated capacity to 2.2 million gallons per day. The advanced sewage treatment plant is designed for biological nutrient removal to meet stringent effluent permit requirements for discharge into Quantico Bight. The treatment process consists of primary treatment, primary clarification, denitrification and nitrification, final clarification, filtration, ultraviolet disinfection, post aeration, anaerobic digestion, and sludge dewatering. Mainside is subject to NPDES Permit No. VA0028363, reissued March 19, 1998. Mainside STP receives domestic, commercial and other wastewater resulting from normal operations at MCB, Quantico.

Virginia Department of Environmental Quality has assigned an acute 2:1 dilution factor for discharges from Mainside STP to Quantico Bight. There have been no past studies of the actual dilution capacity of Quantico Bight. The objective of this study is to investigate the actual dilution capacity of Quantico Bight and demonstrate that a dilution factor of greater than 2:1 is achievable within the Bight.

### **1.1 VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY MIXING ZONE POLICY**

Virginia water quality standards specifically allow the use, where appropriate, of mixing zones when establishing effluent limits for discharges. Virginia Regulations on Water



Source: USGS 7.5 minute Quadrangle, Quantico. Photo Revised 1983

Quality Standards (9 VAC 25-260-00 *et seq.* [December 1997]) cover mixing zones under General Criteria 9 VAC 25-260-20.B. This section gives the State Water Quality Board the authority to '*use mixing zone concepts in evaluating permit limits for acute and chronic standards in 9 VAC-25-260-140 B.* Section B, Mixing Zones, also presents what a mixing zone established by the Board must not do:

- a. *Prevent movement of passing or drifting aquatic organisms through the water body in question;*
- b. *Cause acute lethality to passing or drifting aquatic organisms;*
- c. *Be used for, or considered as, a substitute for minimum treatment technology required by the Clean Water Act and other applicable State and Federal laws;*
- d. *Constitute more than one-half of the width of the receiving watercourse nor constitute more than one-third of the area of any cross section of the receiving watercourse;*
- e. *Extend downstream at any time a distance more than five times the width of the receiving watercourse at the point of discharge.*

Regulation 9 VAC-25-260-140 B, Subpart 4, also details procedures for allowing the Board to waive the requirements of items d and e above:

- a. *The Board determines on a case by case basis that a complete mix assumption is appropriate, or*
- b. *A discharger provides an acceptable demonstration of:*
  - (1) *Information defining the actual boundaries of the mixing zone in question; and*
  - (2) *Information and data proving no violation of paragraphs B.1.a, B.1.b, and B.1.c by the mixing zone in question.*

Guidance on the implementation of the Mixing Zone Standard is contained in Guidance Memo No. 00-2001, "Guidance on Preparing VPDES Permit Limits", dated August 24, 2000. The mixing zone guidance in this document is generally geared towards mixing zone establishment within free flowing streams. However, tidally influenced water bodies are covered to some extent, with limited relevance to the conditions of Quantico

Bight. Specifically, the guidance does state that a discharger must provide actual physical/chemical data to demonstrate acceptable mixing zone conditions.

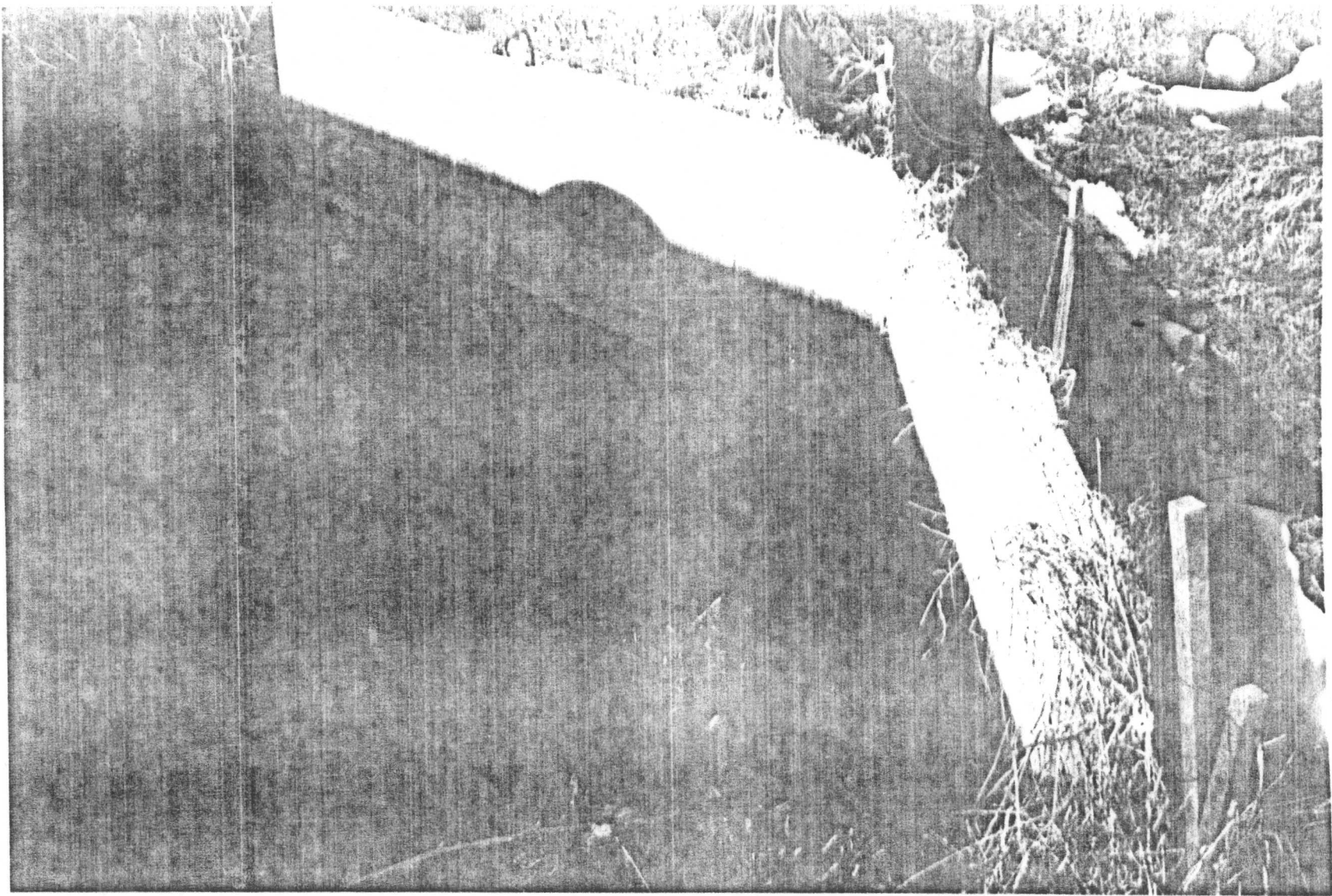
Regulations on Water Quality Standards (*9 VAC-25-260-140 B*) allow for the waiver of requirements that the mixing zone cannot:

- B.1.d Constitute more than one-half of the width of the receiving watercourse nor constitute more than one-third of the area of any cross section of the receiving water course;
- B.1.e Extend downstream at any time a distance more than five times the width of the receiving watercourse at the point of discharge.

Acceptance of the waiver may be possible if 1) it is determined that a complete mix assumption is appropriate; or 2) a discharger provides an acceptable demonstration of information defining the actual boundaries of the mixing zone, and information and data proving that movement of passing and drifting organisms is not prevented, that acute lethality to passing and drifting organisms is not caused, and that the mixing zone is not a substitute for minimum treatment (per VR680-21-01.2.C.4.B). Use of this waiver represents an opportunity for MCB, Quantico to meet the intent of the regulations by offering a demonstration that the receiving waters adjacent to Mainside STP provide sufficient volume for dilution without preventing passage and while protecting drifting organisms.

## **1.2 SITE DESCRIPTION**

The Mainside STP outfall is located by heading in a southwesterly direction away from Mainside, and is located at 38° 30' 52.94" North and 77° 17' 56.99" West (See site map, Figure 1). The discharge pipe terminates at a concrete headwall (See Photo 1). Wastewater effluent is discharged directly into a riprap and grass lined drainage ditch, aligned in a southeasterly direction for approximately 60 feet. The STP effluent then flows under a roadway through a 36-inch corrugated steel pipe culvert. After passing beneath the roadway the effluent enters an unlined and naturally vegetated ditch. This section of the ditch is approximately 80 feet in length and changes direction of the flow to



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All Environmental Consultants



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**Mainside STP Outfall**  
MCB, Quantico, Virginia  
Mainside STP Mixing Zone Study

Photo 1

a more east, southeasterly direction. The terminus of the ditch (referred to as the outfall discharge point or location) is located at approximately 38° 30' 50.33" N and 77° 17' 57.47" W, discharging into the Quantico Bight (see STP discharge point on Figure 1).

Water quality characteristics of the Quantico Bight have been studied in the past. The United States Environmental Protection Agency conducted a study in 1981 to answer whether Quantico Bight was a water body separate from the Potomac River, based on water quality differences. USEPA determined that water quality within Quantico Bight was not significantly different from that of the main stem of the Potomac River. USEPA also determined that the volume of water within the Bight is approximately 150 times that of the average discharge from the plant (approximately 1.4 MGD), resulting in an estimated volume of 210 million gallons (Letter from USEPA to Francis J. Mulhern, Federal Facilities Compliance Officer, MCB Quantico, dated March 24, 1982).

### **1.3 PROJECT APPROACH**

AH/MW developed a 2-phase approach to investigate the natural dilution capacity of Quantico Bight. Phase I of the study, discussed in this Technical Memorandum, consisted of conducting preliminary modeling as a planning tool to determine whether a more comprehensive examination (Phase II), including a dye tracer study and refinement of the model used in Phase I, was warranted.

## **2.0 Phase I - Preliminary Modeling**

A literature review was conducted to identify past studies of the Potomac River that may provide information about dilution, dispersion, and current flows. A number of relevant modeling projects were found.

Thoman and Mueller (1987) reported tidal dispersion of the lower Potomac River to range from 6 to 10 square miles per day (smpd), based on values calculated for the Potomac Estuary Model study (Thoman 1985). Hydroqual, Inc. (1982) reported a tidal

dispersion value of 0.66 smpd for an unnamed embayment near Piscataway embayment and an approximate value of 0.05 smpd in Piscataway embayment. Naval Surface Weapon Station, Dahlgren, Virginia, located approximately 25 miles downstream conducted a dilution mixing zone study in 1992 (Malcolm Pirnie, Inc., 1992). The physical characteristics of the outfall location are similar to those encountered at Quantico Bight. Average depth in the vicinity of the Dahlgren outfall was 2 meters, while velocity was determined to be approximately 0.004 m/s. A dye tracer study was included as part of the Dahlgren Project. Results of the dye study indicated that dispersion in the vicinity of the discharge location was approximately 0.07 m/s longitudinally (upstream and downstream of the outfall) and 0.21 m/s laterally from the outfall (across the channel from the outfall). A modeling study conducted at Neabsco Creek in the vicinity of the H.L. Mooney Wastewater Treatment Plant found dilution factors ranging from 3.9:1 to 2.4:1 (Greeley and Hansen/Limno-Tech, Inc. 1995) for a plant discharging 12 to 24 MGD, respectively. For the mouth of Neabsco Creek, approximately 5.5 miles upstream of Quantico Bight, a subsequent phase of the previously mentioned study (Greeley and Hansen, 1997) found dilution factors ranging from 19.7:1 to 24.2:1 for combined WWTP discharges of 24 to 30 MGD (the contributions of both the Dale City STP and the Mooney STP were combined in this study).

Following the literature review, a field visit was conducted by AH/MW on August 16 and 17, 2000. The purpose of this visit was to gather background information about the Mainside STP and to collect information about the discharge and receiving water body hydrodynamic characteristics. This information was to be used for the preliminary modeling phase of the project. Additionally, a bright green fluorescent dye was added to the discharge during various times of the tidal cycle to visually observe the natural behavior of the discharge plume within the first 300 feet of the outfall.

Some of the basic characteristics of Quantico Bight include the following. The average length of Quantico Bight is approximately 1,280 meters. The average width is approximately 510 meters measured to a point where the main branch of the Potomac

River is located (This is also the location of the political boundary between Virginia and Maryland waters). Average depth, based on mean low water bathymetric data from USGS 7.5-minute quadrangle (Quantico), is about 1.23 meters. A small tract of land, named Chopawamsic Island, is located in the southern half of the Bight.

## **2.1 PRELIMINARY MODELING**

Two mathematical models were used to simulate the behavior of the Mainside STP discharge. Simulations were first conducted using the Cornell Mixing Zone Model (CORMIX), a three-dimensional, advection/dispersion model. MARINA, a two-dimensional advection/dispersion model developed by researchers at Virginia Institute of Marine Science (Hamrick, 1989) was subsequently used because of its applicability to model advection/dispersion within the nearfield, shallow area surrounding the outfall. Descriptions of the models, along with set up and use information and the results of model runs are presented in the sections below.

### **2.1.1 CORMIX3 Model**

CORMIX is a software system for the analysis, prediction, and design of aqueous toxic or conventional pollutant discharges into diverse water bodies. The program is set up to concentrate on the geometry and dilution characteristics of the initial mixing zone. CORMIX was originally developed under the assumption of steady state conditions, however the latest version (CORMIX GI-Version 4.1 GT), used for this study, allows application to highly unsteady environments, such as tidal reversal conditions that would be encountered within Quantico Bight. CORMIX contains three separate models, CORMIX1, CORMIX2, and CORMIX3. CORMIX3 is designed to analyze buoyant or neutrally buoyant surface discharges that result when an effluent enters a larger water body laterally, through a canal, channel, or near surface pipe, as is the case for the Mainside STP, and allows the simulation of tidal reversal conditions.

### **CORMIX3 Model Input**

CORMIX3 requires the input of a variety of values necessary to simulate the behavior of the effluent plume. They include data about the ambient conditions of the receiving water, the tidal period, maximum tidal velocity, Manning's n number or Darcy-Weisbach friction factor, wind speed, effluent and receiving water density data, discharge location with respect to shore, depth at discharge, geometry of discharge channel, bottom slope at discharge, effluent flow rate, temperature or density of the effluent, and concentration of any substances being modeled. To obtain predicted dilution at specified distances from the outfall, it was assumed that the effluent contained a conservative substance having a 100 µg/l concentration. Data input sheets for the CORMIX3 model runs are presented in Appendix A.

The Mainside STP effluent discharge can be categorized as a neutrally buoyant surface water discharge. Temperature and salinity differences between the Mainside effluent and the receiving waters of Quantico Bight are negligible. Salinity measurements of the effluent and the receiving water indicated that both were freshwater.

### **CORMIX3 Results**

Model runs were first conducted assuming steady state, time invariant conditions in order to provide a baseline for comparison to more realistic unsteady state, time variant model runs, designed to simulate conditions that normally prevail within Quantico Bight.

In the steady state mode, ambient flow rate was found to be a critical factor in controlling the plume behavior and predicted dilution at the edge of the plume. To understand how the model would predict the plume behavior within the Bight, the downstream ambient flow rate was varied from 0.5 meters per second (typical of currents found in the main stem of the Potomac River during maximum flood or ebb tides) to low flow values approaching zero (as may be found during near stagnant conditions, when slack tides occur within the Bight). The model proved to be highly unstable at flow rates below 0.2 m/s. Based on observations of flow rates within the Bight during a full tidal period, flow

rates less than 0.2 m/s inside the Bight during periods of slow moving currents are common.

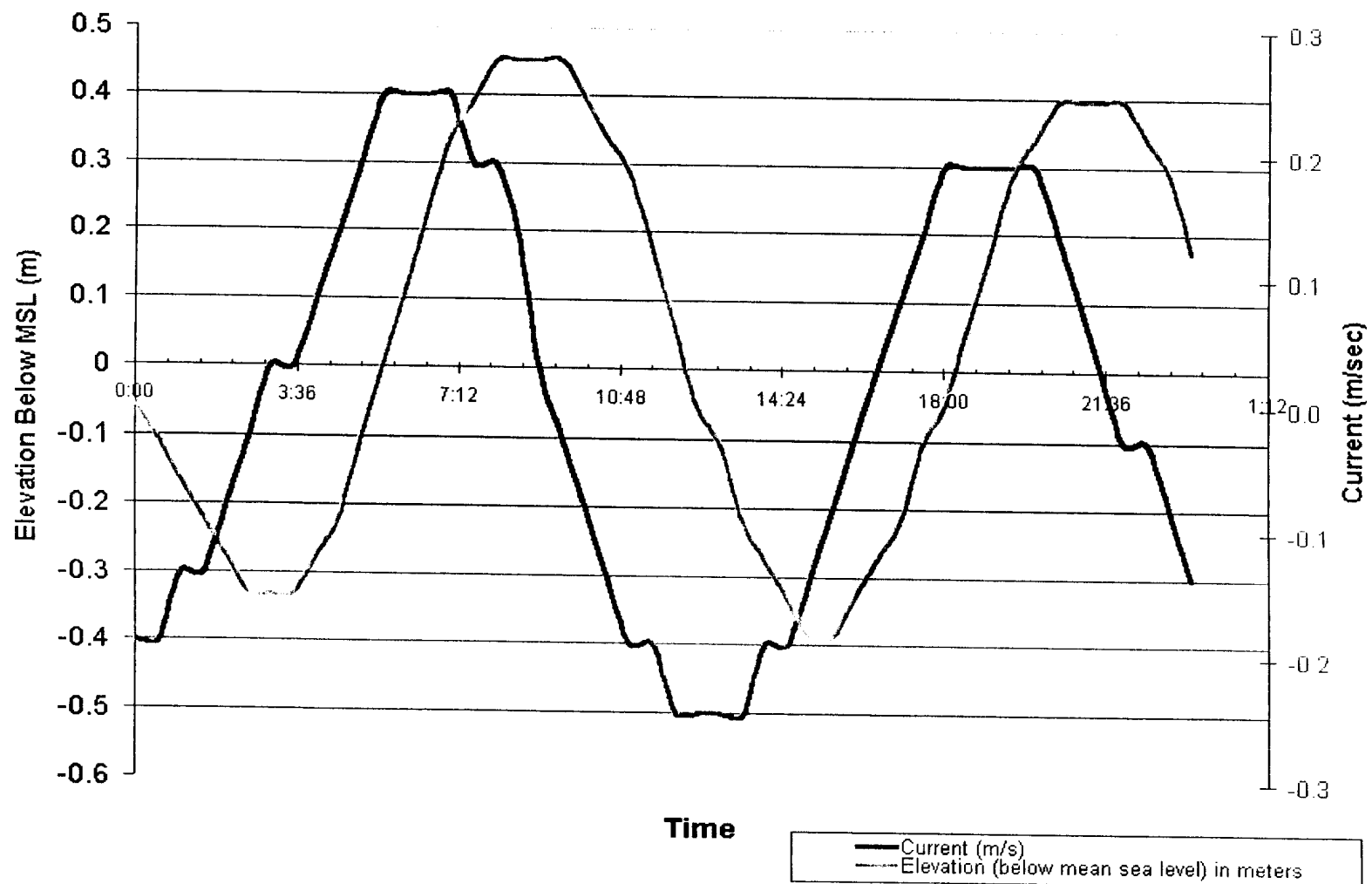
Because estuaries are characterized by highly variable ambient conditions during the tidal cycle, steady state conditions are not truly appropriate for simulating actual environmental conditions of a tidally influenced water body. Therefore, the CORMIX3 model was subsequently run in an unsteady state mode to simulate the estuarine conditions within Quantico Bight.

The developers of the CORMIX 3 model recommend running a number of scenarios to encompass the typical tidal cycle. For Quantico Bight the following 7 scenarios were examined. (Refer to Figure 2, showing estuary data for tidal elevation and current):

- a. Shortly after slack low tide
- b. 1 hour following slack low tide
- c. 2 hours following slack low tide
- d. Maximum flood current
- e. High slack tide
- f. 1 hour following high slack tide
- g. Maximum ebb tide current

Table 1 shows the tides and currents used for the above simulations. Figure 3 shows a 3D plot of the predicted plume behavior 1-hour after slack low tide. This figure is typical of the plume predictions made by the CORMIX model for the simulated conditions detailed above. The CORMIX3 model assumes that the Mainside STP discharge is directly perpendicular to the ambient river velocity currents. If stagnant or near stagnant conditions are encountered, as when scenarios (a) and (e) are simulated, the model is unable to generate nearfield predictions due to the highly variable and unstable conditions of the ambient receiving water. Results of the model runs were not truly consistent with the behavior of the dyed plume observed when limited visual tracer tests were conducted as part of the field visit.

# Bathymetric Conditions in Potomac River in Vicinity of Quantico Bight



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**Bathymetric Conditions**  
 MCB, Quantico, Virginia  
 Mainside STP Mixing Zone Study

Figure 2

TABLE 1

**Tides and Currents for Thursday August 17, 2000**  
**Mainside STP Mixing Zone Study**  
**MCB, Quantico, Virginia**

Time Instance	Time	Tide (above MLLW) Ft	Tide (w/ respect to MSL*)		Current (m/s)
			Ft	m	
<b>a - Shortly after slack low tide</b>	3:00	0.3	-0.5	-0.15	-0.05
<b>b - 1 hour following low slack tide</b>	4:00	0.4	-0.4	-0.12	0.1
<b>c - 2 hours following low slack tide</b>	5:00	0.7	-0.1	-0.03	0.3
<b>d - Maximum flood tide</b>	6:30	1.3	0.5	0.15	0.4
<b>e - High slack tide</b>	9:00	1.7	0.9	0.27	0.05
<b>f - 1 hour following high slack tide</b>	10:00	1.6	0.8	0.24	-0.2
<b>g - Maximum ebb tide</b>	16:30	0.4	-0.4	-0.12	0.05

**Notes:**

MLLW - Mean Low Low Water (datum on NOS, NOAA Charts that heights and tides reference)

MHW - Mean High Water

MLW - Mean Low Water

MSL - Mean Sea Level (average of MHW and MLW tides)

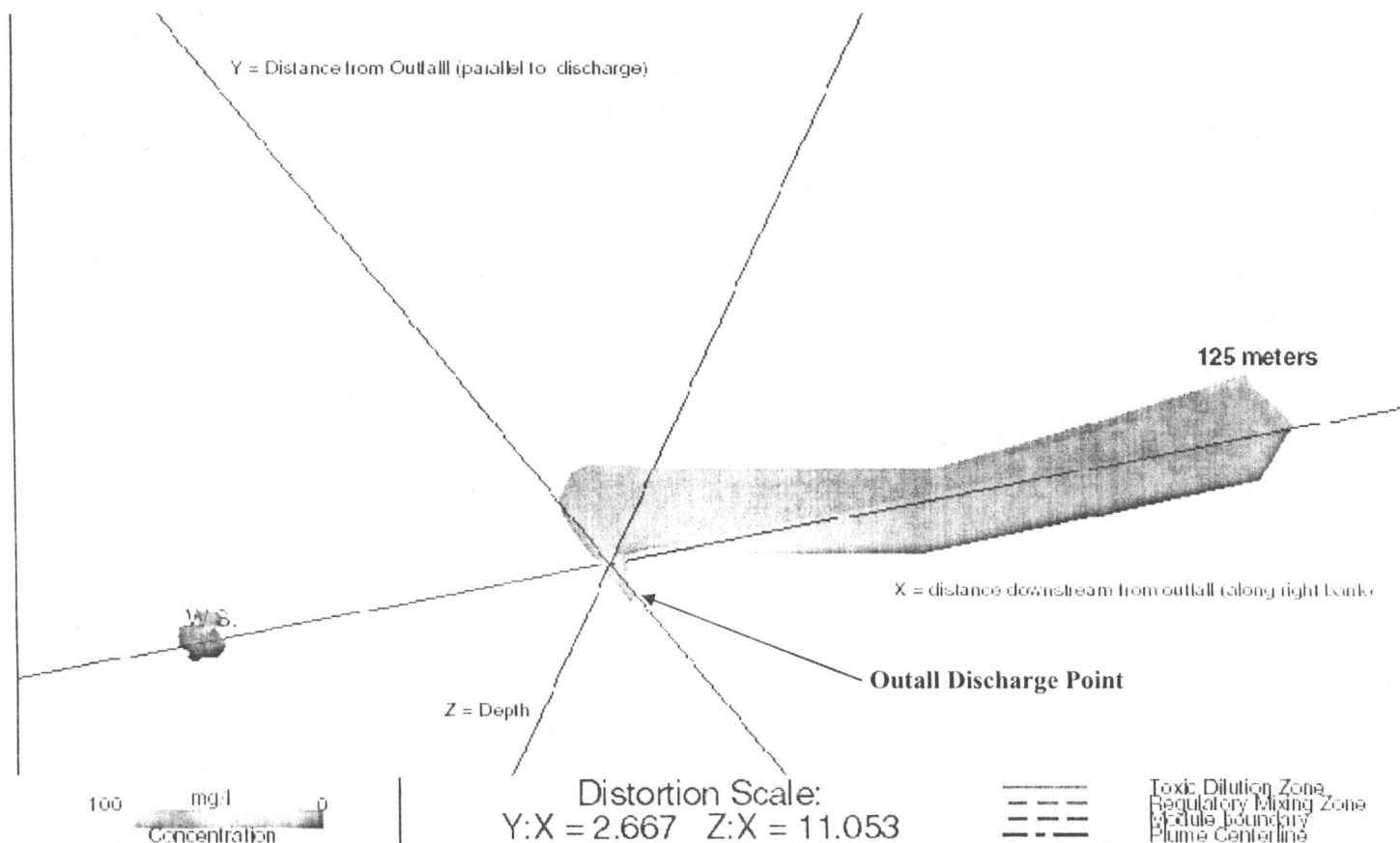
MSL = 0.8 feet (0.24 m) above MLLW

Quantico, VA (38 Degrees 31.30 min North/77 Degrees 16.60 min West)

Based on predictions from Tides and Currents, Nautical Software Inc.

MCB, Quantico Mainside STP  
 3D Plume Prediction  
 Unsteady State, 1 hour following slack low tide

Cormix3 Simulation  
 Flow Class: SA 1



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**3D Plot of Predicted Plume, 1 Hour After Slack Low Tide**  
 MCB, Quantico, Virginia  
 Mainside STP Mixing Zone Study

Figure 3

Because of the influence that ambient current has on the model it is important to discuss the development of these data inputs. Tidal current velocity and tidal elevations used in the model for each of the tidal simulations were obtained from *Tides and Currents* software developed by Nautical Software Inc<sup>1</sup>. It must be noted that these predictions are for a location outside of the Bight, within the main portion of the Potomac River. It is our opinion that the current predictions are greater than those that would be observed within the Bight, based on a number of factors including the shallowness of the embayment, the extent of separation of the Bight from the main branch of the Potomac River, the width of the bight (approximately 500 meters), and to some small extent the dense growth of submerged aquatic growth within the Bight. Therefore the predictions obtained from CORMIX3 show a plume overly influenced by ambient flow rates. The plume predictions by CORMIX3 show the plume hugging the downstream bank to a greater extent than what most likely occurs naturally and was observed in the field.

It was concluded that the steady state and unsteady state model runs using CORMIX3 were not directly applicable to the nearfield conditions observed at the project site. Because of this, AH/MW selected a more appropriate model with the capability to model two-dimensional advection dispersion in low flow water bodies. The MARINA model was evaluated and selected to provide a better understanding of the nearfield plume behavior of the Mainside STP effluent as it enters Quantico Bight.

### **2.1.2 MARINA Model**

The MARINA model is a two-dimensional advection dispersion model. The model was developed by two Virginia Institute of Marine Science Researchers, Hamrick and Nielson (Hamrick, 1989). MARINA can be described as a simplistic model that takes into

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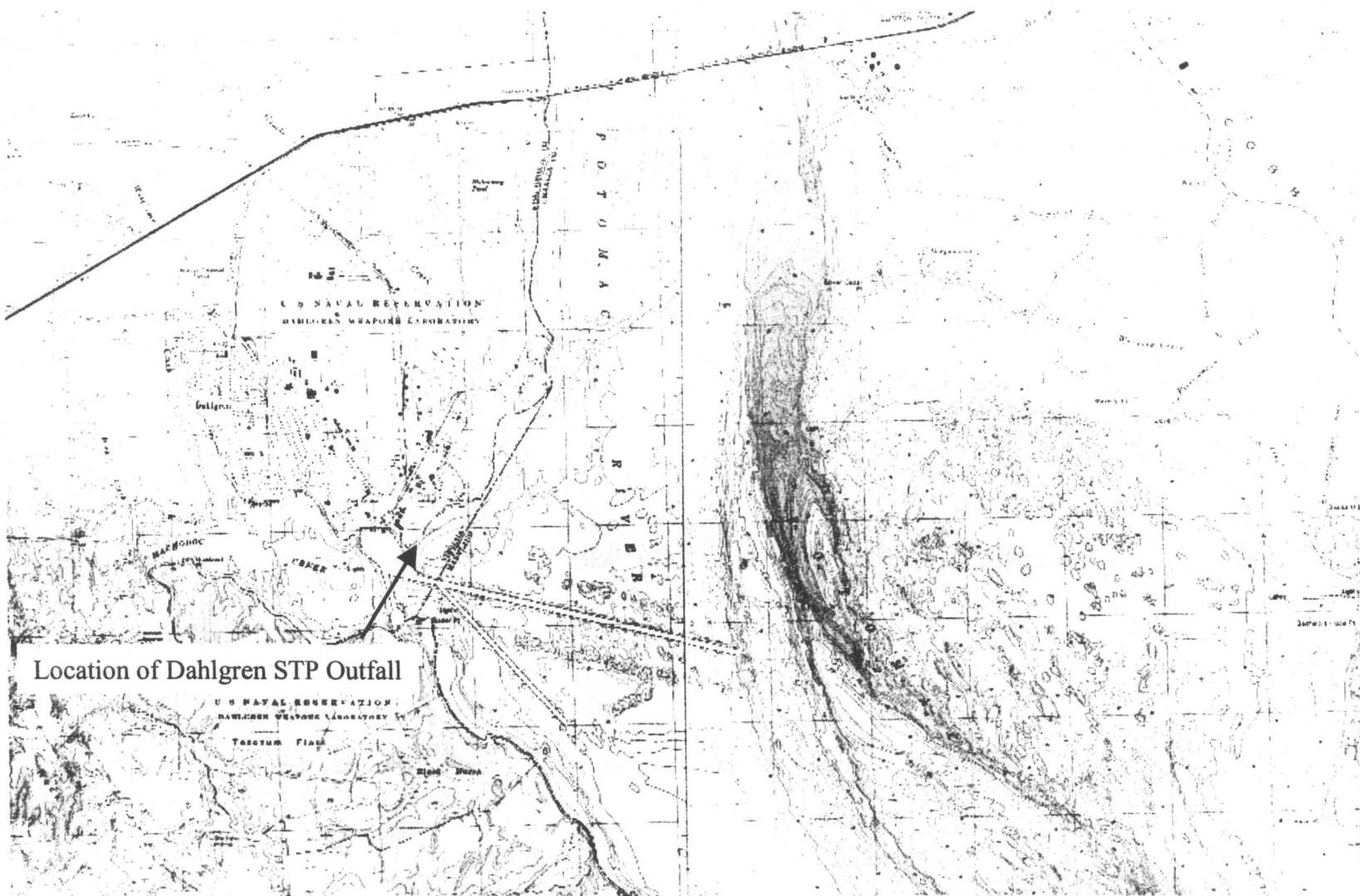
<sup>1</sup> The software package uses National Ocean Service (NOS) data for reference tide and current stations near the area of interest to make the predictions. NOS is a division of the National Oceanic and Atmospheric Administration (NOAA).

account first order decay. MARINA was developed to predict fecal coliform buffer zones for boat marinas on wide channels (greater than 100 meters) with measurable freshwater discharge in addition to tidal driven flow. The parameters required for input are:

- $H$  = average depth, [m]
- $D_x$  = tidal dispersion in the x direction, which is parallel to the shoreline, upstream and downstream of the effluent outfall. Referred to as longitudinal dispersion [ $m^2/sec$ ]
- $D_y$  = tidal dispersion laterally with respect to the outfall, perpendicular to the shoreline. Referred to as transverse dispersion [ $m^2/sec$ ]
- $u$  = cross section average velocity of the net freshwater discharge through the channel [m/sec]
- $B$  = channel width, [m]
- $K_d$  = first order decay constant, [1/sec]
- $M$  = mass loading rate, [1/sec]

Average depth ( $H$ ) within Quantico Bight was developed by examining the Quantico 7.5-minute USGS Quadrangle. Bathymetric data is presented on the quad sheet for mean low water. From this information average depth was found to be 1.23 meters.

The dispersion parameters  $D_x$  and  $D_y$  are normally developed based on information from dye tracer studies conducted in the vicinity of the discharge in question. In the case of Quantico Bight a dye tracer study to determine dispersion had not been previously conducted. However a dye tracer study was conducted on the Potomac River in the vicinity of the Naval Surface Weapon Station, Dahlgren Virginia to assess the impact of a proposed sewage treatment plant upgrade that included an increase in discharge flow rate (Malcolm Pirnie, Inc., 1992). The Dahlgren STP outfall discharges to a shallow water area similar to the Quantico Bight embayment (see Figure 4). Results of the dye tracer study showed that longitudinal dispersion was three times the transverse dispersion. The values developed for the Dahlgren study were  $0.21 m^2/sec$  for  $D_x$  and  $0.07 m^2/sec$  for  $D_y$ .



Source: USGS 7.5 minute Quadrangles, Dahlgren, VA and Colonial Beach North - Maptech, Inc.



**NSWC, Dahlgren, VA. STP Discharge Area**  
 MCB, Quantico, Virginia  
 Mainside STP Mixing Zone Study

Figure 4

Based on the similarities of the discharges and embayments, these values are suitable for use as the dispersion parameters in the Mainside STP preliminary modeling.

Velocity ( $u$ ) was not measurable within Quantico Bight during the field visit. Flow rates were less than the minimum detectable range (0.3 m/s) of the field flow meter available. The Dahlgren dye tracer study did produce measurements of velocities. Again, it was assumed that the conditions at Dahlgren were similar to the existing conditions at Quantico Bight, therefore the velocity values developed from that study were deemed suitable for the modeling at Quantico Bight. The velocity was set at 0.004 m/sec to simulate low flow conditions. Slack periods were modeled by reducing the ambient flow value,  $u$ , to an order of magnitude lower, 0.0004 m/sec.

The channel width,  $B$ , was set to 500 meters. The model assumes an area of interest 500m laterally and transversely from the outfall discharge point. This distance was selected because it is the distance from the Mainside discharge point to the western edge of Quantico Bight. Recall that the length of the Bight is approximately 1280 m and the width is slightly greater than 500 meters.

In order to model the dispersion/advection of a conservative substance, the decay constant  $K_d$  was set to an extremely low value to negate the impact of decay on the model simulations. The impact of setting  $K_d$  to a value of  $1.0 \times 10^{-9}$  was that the model would use only advection and dispersion to determine the plume characteristics. Decay of the hypothetical substance would not account for removal (settling) or transformation of the substance being modeled.

The mass loading value,  $M$ , for the Mainside STP discharge was developed simply by assuming that a hypothetical conservative substance was present in the Mainside effluent at a concentration of 100  $\mu\text{g/L}$ . At an average flow rate of 1.02 million gallons per day (MGD) (based on daily effluent discharge rates for an 18 month period ending in June 2000) the loading value was calculated to be 4,460  $\mu\text{g/sec}$ . Using the maximum design

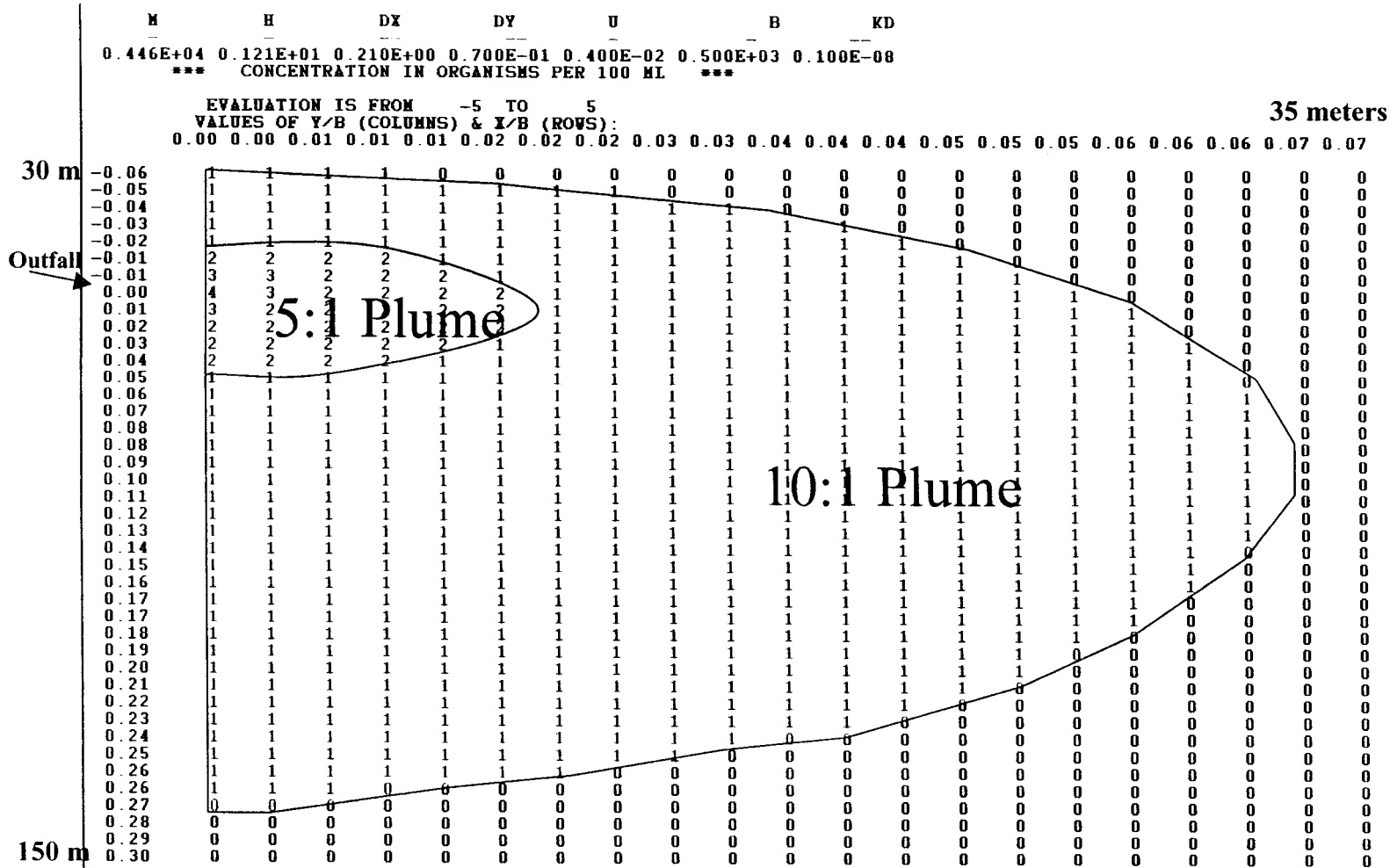
flow rate of 2.2 MGD and factoring in the conservative substance concentration gave a loading value of 9,638  $\mu\text{g}/\text{sec}$ .

### MARINA Model Results

Three scenarios were developed to simulate conditions within Quantico Bight. Each of these scenarios are explained below:

- **Scenario QB-1:** This scenario represents an average STP flow rate of 1.02 MGD and a conservative substance concentration of 100  $\mu\text{g}/\text{L}$ .
- **Scenario QB-2:** This scenario represents a maximum STP flow rate of 2.2 MGD (corresponding to the rated capacity of Mainside STP following completion of upgrades) and a conservative substance concentration of 100  $\mu\text{g}/\text{L}$ .
- **Scenario QB-3:** This scenario represents the conditions that occur at least 4 times per day prior to tidal reversal, corresponding to high slack and low slack tides. This scenario simulates near stagnant conditions within the Bight. Mainside STP discharge was set at 2.2 MGD while the ambient flow rate was lowered an order of magnitude to a value of 0.0004 m/s.

Output data sheets for the 3 MARINA model scenarios presented above are presented in Figures 5, 6, and 7, respectively. These data sheets contain the input values listed near the top of each sheet. All values are input as metric units. The data section of the output sheet consists of rows and columns of values. The top row indicates the fractional longitudinal distance from the outfall (in the Y direction). The left-hand column represents the transverse distance from the outfall (in the X direction). The value of 0.00 in the left-hand column represents the location of the outfall. Positive values in the left-hand column represent fractional distances downstream of the outfall, while negative values represent fractional distances upstream of the outfall. The values within the data field represent effluent concentrations at a coordinate location. The concentrations are read as 1 per 100 ml (i.e.,  $\mu\text{g}/100\text{ ml}$ ). Because the original concentration of the hypothetical substance was set at 100  $\mu\text{g}/\text{l}$ , the resultant values in the data field can be



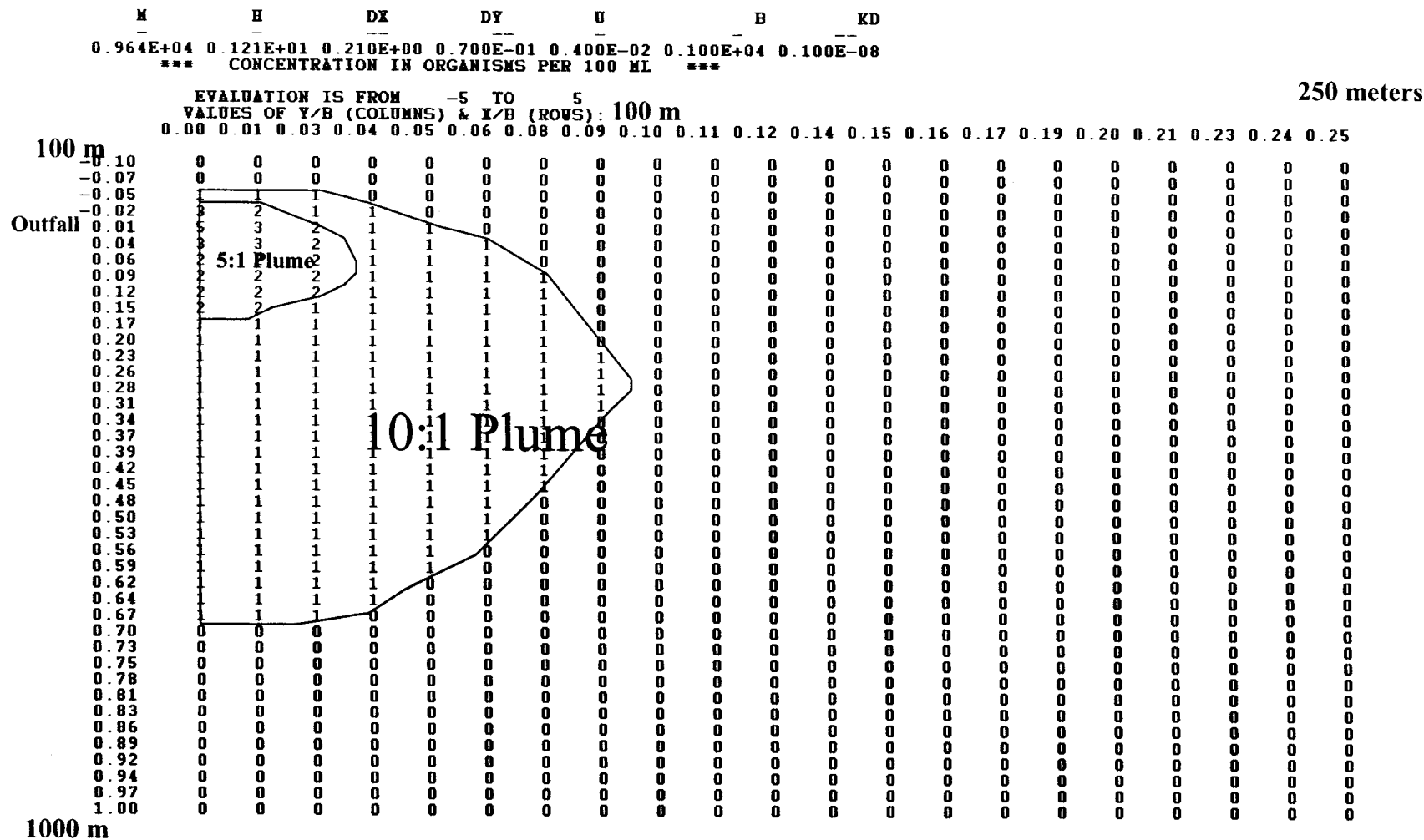
MARINA Model Output Data Sheet for Mainside STP Average Flow of 1.02 MGD and a Conservative Substance  
Concentration of 100 ug/L. Ambient flow of 0.004 m/sec.



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Mainside Avg. Flow w/ 100 ug/L Conc.  
MCB, Quantico, Virginia  
Mainside STP Mixing Zone Study

Figure 5



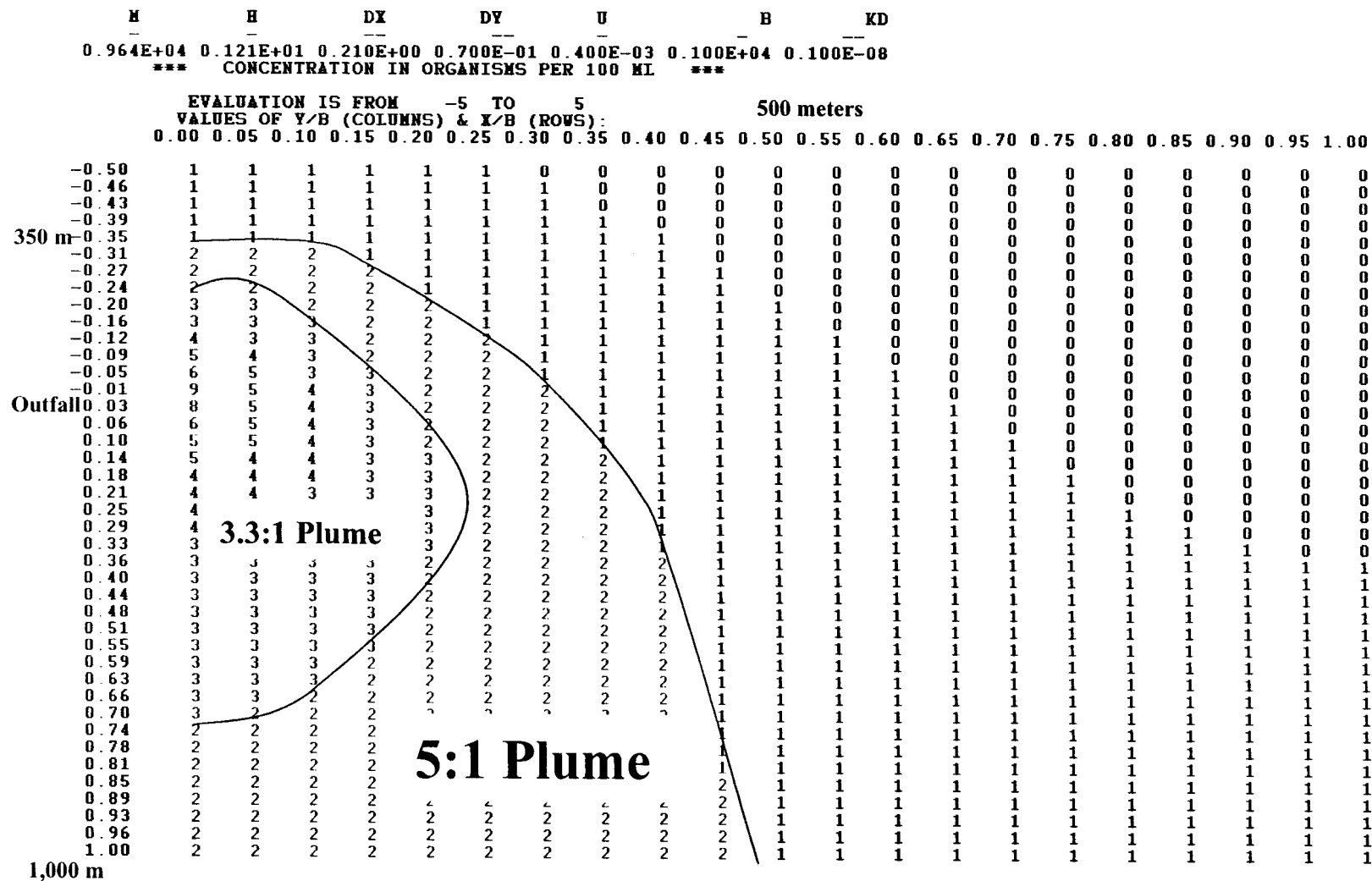
MARINA Model Output Data Sheet for Mainside STP Maximum Capacity Flow of 2.2 MGD and a Conservative Substance Concentration of 100 ug/L. Ambient Flow of 0.004 m/sec



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**Mainside Maximum Capacity Flow w/ 100 ug/L Conc.**  
 MCB, Quantico, Virginia  
 Mainside STP Mixing Zone Study

Figure 6



MARINA Model Output Data Sheet for Mainside STP Maximum Capacity Flow of 2.2 MGD and a Conservative Substance Concentration of 100 ug/L. Under ambient low flow conditions of 0.0004 m/sec (representing an order of magnitude lower than previous model runs).



(10) MONTGOMERY WATSON

Maximum Capacity Flow w/ 100 ug/L Conc.  
MCB, Quantico, Virginia  
Mainside STP Mixing Zone Study

Figure 7

interpreted as a percentage of the original concentration. For example, assume that a concentration of 10 is observed in the data field. This value represents 10  $\mu\text{g}/100\text{ ml}$ , which is equivalent to a concentration of 100  $\mu\text{g}/\text{L}$ , 100 percent of the original concentration.

Figure 5 shows the data output sheet for an average STP flow rate of 1.02 MGD and a conservative substance concentration of 100  $\mu\text{g}/\text{L}$ . In this figure the model predicts that a 10:1 dilution will be observed approximately 30 meters laterally from the outfall. The edge of the 10:1 dilution boundary is predicted to extend approximately 30 meters upstream and 135 meters downstream.

Figure 6 shows the data output sheet for a maximum STP flow rate of 2.2 MGD (corresponding to the rated capacity of Mainside STP following completion of upgrades) and a conservative substance concentration of 100  $\mu\text{g}/\text{L}$ . In this figure the model predicts that the 10:1 plume boundary extends approximately 100 meters into the Bight. The upstream 10:1 boundary is approximately 70 meters, while the 10:1 plume extends downstream approximately 700 meters. This figure also shows that the original concentration is reduced by nearly 80 percent at approximately 40 meters, as predicted by the model.

A third model run was conducted to simulate near stagnant conditions (a short-lived condition that occurs during slack high and low tides) within the bight, while STP discharge was set at 2.2 MGD (see Figure 7). The ambient flow rate was lowered an order of magnitude to a value of 0.0004 m/s. Even at this low ambient flow rate, the concentration of the discharge is reduced by 80 percent (5:1) at a distance of approximately 500 meters from the outfall.

### **3.0 CONCLUSION AND RECOMMENDATION**

The entire size of Quantico Bight is estimated to be approximately 650,000 square meters, with an average depth of approximately 1.5 meters (slightly greater than the 1.2

meters used in the computer simulations, since only the area in the immediate vicinity of the outfall was examined). This corresponds to a dilution volume of approximately 209 million gallons, agreeing well with the USEPA's estimate of approximately 150 times the average flow rate of the Mainside STP, or 210 million gallons. The width of the Potomac River at Quantico Bight is approximately 2 miles, including the width of the Bight.

AH/MW conducted a field visit to obtain a general understanding of the natural behavior of the Mainside STP discharge. Data were collected for use as mathematical model inputs. Additionally, some limited dye tracer studies were performed to visually observe the behavior of the STP effluent plume.

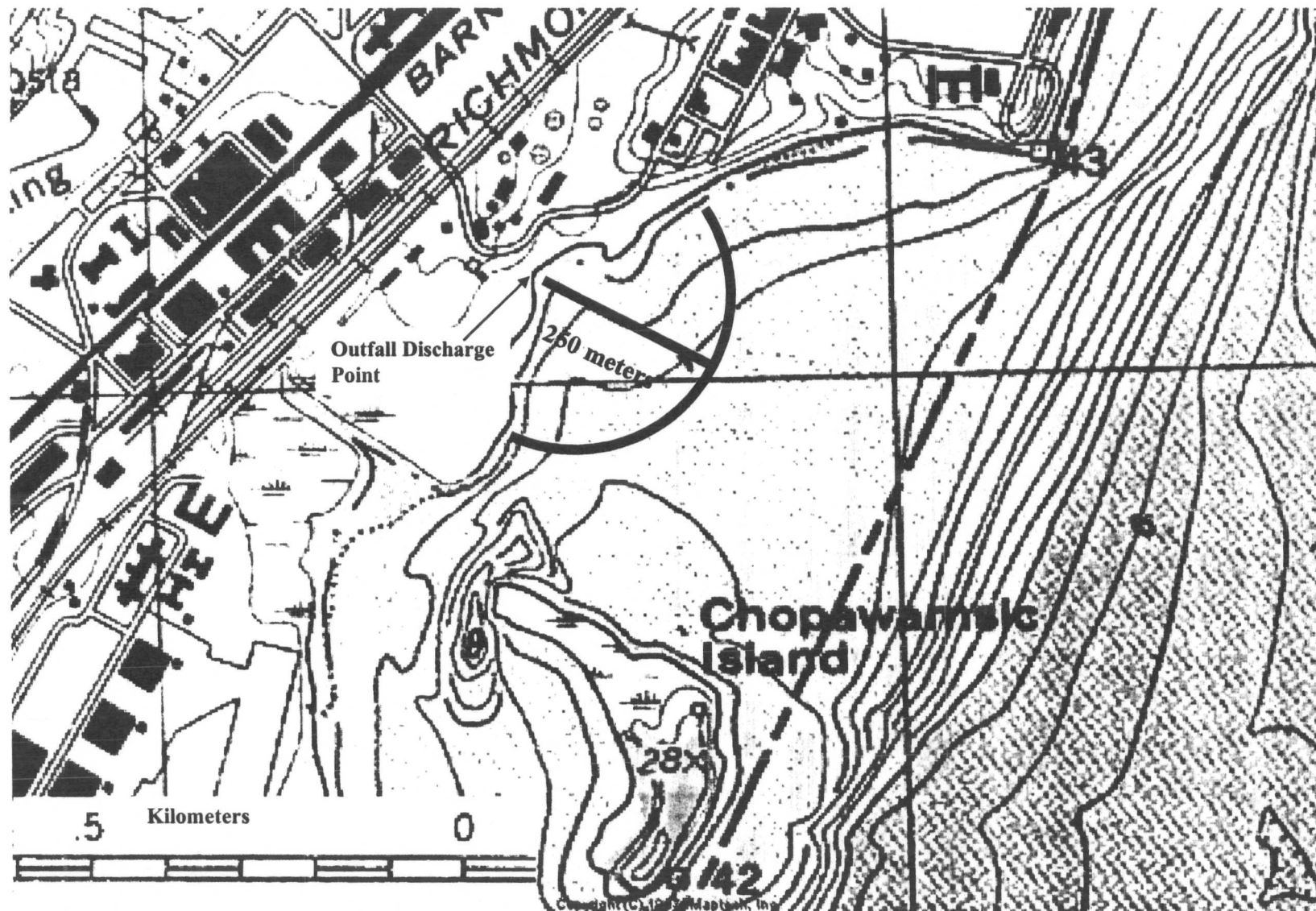
Two mathematical models were used to simulate the behavior of the Mainside STP discharge. Simulations were first conducted using the three dimensional, advection dispersion model, CORMIX3. MARINA, a two-dimensional advection/dispersion model was subsequently used because of its ability to model advection/dispersion within the nearfield boundary surrounding outfalls.

Virginia DEQ Guidance suggests a 2:1 acute dilution factor and a 50:1 chronic dilution factor for tidally influenced water bodies, unless the permit holder can demonstrate that greater dilution is achievable. The extent of tidal influence on the Potomac River extends upstream of Quantico Bight, beyond Washington, D.C.

USEPA has studied Quantico Bight and has determined that the water quality within the Bight is not different from the water within the main stem of the Potomac River. This is attributable to the fact that there is significant exchange between the Bight and the River and suggests that the Bight is not isolated from the main stem of the Potomac River. Aquatic vegetation has been cited as a possible impediment to water flow within the Bight. A dilution study conducted on Neabsco Creek, just upstream of Quantico Bight concluded that "the presence of aquatic vegetation should not significantly affect mixing characteristics or the extent of physical mixing area" (Greeley and Hansen, 1997). This conclusion was based on the fact that the Manning's roughness coefficient was varied

and showed little impact on the results of CORMIX3 model runs for the Neabsco Creek embayment, similar results were observed for the Quantico Bight runs.

Based on this study it is our opinion that Quantico Bight is of sufficient size, depth and volume to support a dilution factor greater than 2:1. The Mainside STP maximum discharge capacity will be 2.2 MGD. As shown in Figure 6, the edge of the 10:1 discharge plume is predicted to extend approximately 100 meters longitudinally from the outfall discharge point. The edge of the plume is predicted to extend upstream approximately 50 meters and downstream about 700 meters. Because of the barrier created by the Chopawamasic Island, it is not expected that downstream advection of the plume will extend as far as predicted by the model. It is more likely that the plume would move in a more longitudinal direction into deeper water of the Bight. This would result in an increased volume of dilution water, and allow for greater dilution of the Mainside STP effluent. AH/MW recommends establishing a physical mixing zone with a dimension extending 250 meters radially from the discharge point, extending to a point within the Bight where the mean low water depth is approximately 1 meter. This mixing zone is shown graphically in Figure 8. This mixing zone is based on the assumptions that tidally averaged ambient flow rates will be at or greater than 0.004 m/sec, and that the average depth for the Bight (averaged over 1 hour before and after low slack tide) is approximately 1.21 meters. The boundary of this mixing zone is predicted to encompass a plume with a 10:1 reduction in effluent concentration well within the proposed edges of the zone, even at a STP discharge rate of 2.2 MGD (Refer to Figure 6).



Source: USGS 7.5 minute Quadrangle, Quantico, VA. Maptech Inc.

10/31/2007 11:47:01 AM

Facility = Quantico Mainside WWTP  
Chemical = Ammonia (Nov -Mar) MD Criteria  
Chronic averaging period = 30  
WLAa = 144  
WLAc = 170  
Q.L. = .2  
# samples/mo. = 30  
# samples/wk. = 8

Summary of Statistics:

# observations = 1  
Expected Value = 9  
Variance = 29.16  
C.V. = 0.6  
97th percentile daily values = 21.9007  
97th percentile 4 day average = 14.9741  
97th percentile 30 day average = 10.8544  
# < Q.L. = 0  
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

10/17/2007 3:51:35 PM

Facility = Quantico Mainside  
Chemical = Total Recoverable Chlorine  
Chronic averaging period = 4  
WLAa = 190  
WLAc = 550  
Q.L. = 100  
# samples/mo. = 30  
# samples/wk. = 8

Summary of Statistics:

# observations = 1  
Expected Value = 200  
Variance = 14400  
C.V. = 0.6  
97th percentile daily values = 486.683  
97th percentile 4 day average = 332.758  
97th percentile 30 day average = 241.210  
# < Q.L. = 0  
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity  
Maximum Daily Limit = 190  
Average Weekly limit = 113.335966321422  
Average Monthly Limit = 94.1680211348591

The data are:

200

10/9/2007 10:11:28 AM

Facility = Quantico Mainside  
Chemical = Copper  
Chronic averaging period = 4  
WLAa = 70  
WLAc = 250  
Q.L. = 1  
# samples/mo. = 1  
# samples/wk. = 1

Summary of Statistics:

# observations = 1  
Expected Value = 4  
Variance = 5.76  
C.V. = 0.6  
97th percentile daily values = 9.73367  
97th percentile 4 day average = 6.65516  
97th percentile 30 day average = 4.82421  
# < Q.L. = 0  
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

10/9/2007 10:14:21 AM

Facility = Quantico Mainside  
Chemical = Selenium  
Chronic averaging period = 4  
WLAa = 200  
WLAc = 250  
Q.L. = 1  
# samples/mo. = 1  
# samples/wk. = 1

Summary of Statistics:

# observations = 1  
Expected Value = 1  
Variance = .36  
C.V. = 0.6  
97th percentile daily values = 2.43341  
97th percentile 4 day average = 1.66379  
97th percentile 30 day average = 1.20605  
# < Q.L. = 0  
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

1

10/17/2007 3:42:42 PM

Facility = Quantico Mainside  
Chemical = Zinc  
Chronic averaging period = 4  
WLAa = 650  
WLAc = 3300  
Q.L. = 5  
# samples/mo. = 1  
# samples/wk. = 1

Summary of Statistics:

# observations = 4  
Expected Value = 19  
Variance = 129.96  
C.V. = 0.6  
97th percentile daily values = 46.2349  
97th percentile 4 day average = 31.6120  
97th percentile 30 day average = 22.9150  
# < Q.L. = 0  
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

12  
17  
18  
29

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1															
2	<b>Spreadsheet for determination of WET test endpoints or WET limits</b>														
3															
4		Excel 97													
5		Revision Date: 01/10/05													
6		File: WETLIM10.xls													
7		(MIX.EXE required also)													
8															
9															
10															
11															
12															
13															
14															
15		Enter data in the cells with blue type:													
16															
17		Entry Date:	11/06/07												
18		Facility Name:													
19		VPDES Number:	VA0028363												
20		Outfall Number:	1												
21															
22		Plant Flow:	2.2 MGD												
23		Acute 1Q10:	0 MGD												
24		Chronic 7Q10:	0 MGD												
25															
26		Are data available to calculate CV? (Y/N)			N										
27		Are data available to calculate ACR? (Y/N)			N										
28															
29															
30		IWC <sub>a</sub>	10 %	Plant flow/plant flow + 1Q10											
31		IWC <sub>c</sub>	2 %	Plant flow/plant flow + 7Q10											
32															
33		Dilution, acute	10	100/IWCa											
34		Dilution, chronic	50	100/IWCC											
35															
36		WLA <sub>a</sub>	3	Instream criterion (0.3 TUa) X's Dilution, acute											
37		WLA <sub>c</sub>	50	Instream criterion (1.0 TUc) X's Dilution, chronic											
38		WLA <sub>a,c</sub>	30	ACR X's WLA <sub>a</sub> - converts acute WLA to chronic units											
39															
40		ACR -acute/chronic ratio	10	LC50/NOEC (Default is 10 - if data are available, use tables Page 3)											
41		CV-Coefficient of variation	0.6	Default of 0.6 - if data are available, use tables Page 2)											
42		Constants eA	0.4109447	Default = 0.41											
43		eB	0.6010373	Default = 0.60											
44		eC	2.4334175	Default = 2.43											
45		eD	2.4334175	Default = 2.43 (1 samp)	No. of sample	1									
46															
47		LTA <sub>a,c</sub>	12.328341	WLA <sub>a,c</sub> X's eA											
48		LTA <sub>c</sub>	30.051865	WLA <sub>c</sub> X's eB											
49		MDL** with LTA <sub>a,c</sub>	30.00000074	TU <sub>c</sub> NOEC =	3.333333										
50		MDL** with LTA <sub>c</sub>	73.1287342	TU <sub>c</sub> NOEC =	1.367452										
51		AML with lowest LTA	30.00000074	TU <sub>c</sub> NOEC =	3.333333										
52															
53		IF ONLY ACUTE ENDPOINT/LIMIT IS NEEDED, CONVERT MDL FROM TU <sub>c</sub> to TU <sub>a</sub>													
54															
55		MDL with LTA <sub>a,c</sub>	3.000000074	TU <sub>a</sub> LC50 =	33.333333	%									
56		MDL with LTA <sub>c</sub>	7.31287342	TU <sub>a</sub> LC50 =	13.674515	%									
57															
58															

**NOTE: If the IWC<sub>a</sub> is >33%, specify the NOAEC = 100% test/endpoint for use**

**\*\*The Maximum Daily Limit is calculated from the lowest LTA, X's eC. The LTA<sub>a,c</sub> and MDL using it are driven by the ACR.**

# INDUSTRIAL WASTEWATER SURVEY

## Mainside Sewage Treatment Plant VA0028363

Note: all facilities discharge domestic sewage.

Customer	Building	Activity	Discharge	Chemical Storage	Chemical Discharge	Pretreat Discharge	General Identification
Dental Clinic	5003	dental evac/xray	oral evacuation	Dental Supplies	yes	Filter	Medical
Medical Clinic	3259	radiology	none	developing mat'l	none		Medical
Medical Clinic	3259	laboratory		acids	yes	Filter	Medical
G3 CVIC	2009	Printing/photo lab	none	none	none		Industrial
MC Association	715	Retail/Photo lab		none	none		Industrial
MCU	3078	Office/Laundry	Wash water	paint	none		Industrial
Museum	3112	painting/finishing	none	paint	none		Industrial
Museum	2121	armory/rstoration	none	polish/cleaners	none		Industrial
MP's	2043	Laboratory office	none	Household cleaners	none		Industrial
MP's	2117	K-9/office	none	Household cleaners			
MP's	3247	Brigoffice/food service	none	Household cleaners	none	grease trap	institutional
VADDESS Russell	3301	Classroom/food service kitchen waste		Paint & paint supplies	none	grease trap	institutional
VADDESS QHS	3307	Classroom/food service kitchen waste		oil	none	grease trap	institutional
VADDESS Burrows	3308	Classroom/food service kitchen waste		gasoline	none	grease trap	institutional
VADDESS Ashurst	4320	Classroom/food service kitchen waste		diesel fuel	none	grease trap	institutional
G-6 M&L Branch	2043	Repair Shop/Garage		Paint & lubricants		oil/water sep	industrial

## MCCS Marine Corps Community Services Branch

Auto Hobby Shop	4	Auto repair/painting/finishing	Paints/lubricants/fluids	none	oil recycling tank	industrial
Marina Gas Station	25	Dispense fuel to boats		none	Antifreeze tank	mercantile
Pool	2078	All Hands Pool	Pool Chemicals	yes		institutional
Pool	3230	Officers' Club Pool				
MCCS Maintenance			adhesives, refrigerants lubricants, cleaners	none		
Clubs of Quantico	3017	Food service	cleaners/degreasers	yes	grease trap	institutional
Golf Course Shed	3306	Grounds keeping/Maintenance	gas, waste oil, lubricants fertilizers, pesticides	none		industrial
Pro Shop/Snack Bar	3306	retail/food service	cleaning supplies		<b>No grease trap</b>	commercial
Marine Corps Exchange	3500		photo chemicals/ developers	none		mercantile
Minimart	3500B	Food/Gas retail	none	none		mercantile
Minimart	3500B	Car Wash	detergent/wax		oil/water sep	mercantile

## Marine Corps Base Utilities

Mainside Water Treatment Plant	1304	Produces potable water  <b>Chemical discharge is through sludge resulting from backwash of filters.</b>	Caustic, Floride Aluminum Sulfate, Sodium Hypochloride Soda Ash polymer	yes		industrial
Central Heating Plant	2012	Boiler blowdown <b>Plant closed down for good on March 15, 2004</b>	salts, boiler chems	not applicable		industrial

## Town of Quantico

369 reidences-295 occupied	residential households	household cleaners		residential
11 restaurants	food service/ kitchen waste	Household cleaners	none	1 grease trap remainder in barrels commercial
7 barbers/beauticians shops	Haircuts	hair products		mercantile
1 tailer shop	cloths alterations	none		mercantile
1 cleaners	laundry only	detergents		commercial
1 cloths store	retail trade/laundry	detergents		mercantile
2 drycleaners	laundry & drycleaning (perc is not sent to drains)	detergents &perc for drycleaning		commercial

PUBLIC NOTICE OF INTENT TO REISSUE A VPDES PERMIT

Citizens may comment on the proposed permit reissuance that allows the release of treated wastewater into a water body in Prince William County, Virginia

**PUBLIC COMMENT PERIOD:**

**PERMIT NAME:** MCB Quantico – Mainside Advanced Sewage Treatment Plant  
Virginia Pollutant Discharge Elimination System Permit (VPDES)

Owners or operators of municipal facilities that discharge or propose to discharge wastewater into the streams, rivers or bays of Virginia from a point source must apply for this permit. In general, point sources are fixed sources of pollution such as pipes, ditches or channels. The applicant must submit the application to the Department of Environmental Quality, under the authority of the State Water Control Board.

**PURPOSE OF NOTICE:** To invite the public to comment on the draft permit.

**NAME, ADDRESS AND PERMIT NUMBER OF APPLICANT:** United States Marine Corps--Quantico  
3250 Catlin Avenue  
Quantico, VA 22134  
VA0028363

**NAME AND ADDRESS OF FACILITY:** MCB Quantico – Mainside Advanced Sewage Treatment Plant  
658 Epperson Avenue  
Quantico, VA 22134

**PROJECT DESCRIPTION:** The United States Marine Corps has applied for reissuance of a permit for the MCB Quantico – Mainside Advanced Sewage Treatment Plant in Prince William County, Virginia. The applicant proposes to release treated sewage at a rate of 2.2 Million Gallons per Day into an unnamed tributary of Quantico Bight in Prince William County that is in the Potomac River Watershed. A watershed is the land area drained by a river and its incoming streams. The sludge will be landfilled. The permit will limit or monitor the following pollutants to amounts that protect water quality: Flow, pH, CBOD, Total Suspended Solids, Total Phosphorus, Enterococci Bacteria, Dissolved Oxygen, Total Nitrogen, Total Kjeldahl Nitrogen, Ammonia as Nitrogen, Nitrite and Nitrate as Nitrogen, and Total Residual Chlorine. The facility is subject to the requirements of 9 VAC 25-820 and has registered for coverage under the General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia.

**HOW A DECISION IS MADE:** After public comments have been considered and addressed by the permit or other means, DEQ will make the final decision unless there is a public hearing. DEQ may hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the proposed permit. If there is a public hearing, the State Water Control Board will make the final decision.

**HOW TO COMMENT:** DEQ accepts comments by e-mail, fax or postal mail. All comments must be in writing and be received by DEQ during the 30 day comment period. The public also may request a public hearing.

**WRITTEN COMMENTS MUST INCLUDE:**

1. The names, mailing addresses and telephone numbers of the person commenting and of all people represented by the citizen.
2. If a public hearing is requested, the reason for holding a hearing, including associated concerns.
3. A brief, informal statement regarding the extent of the interest of the person commenting, including how the operation of the facility or activity affects the citizen.

**TO REVIEW THE DRAFT PERMIT AND APPLICATION:** The public may review the draft permit and application at the DEQ office named below or may request a copy by calling or e-mailing the contact individual below.

**CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS AND ADDITIONAL INFORMATION:**

Name: Anna T. Westernik  
Address: DEQ-Northern Virginia Regional Office, 13901 Crown Court, Woodbridge, VA 22193  
Phone: (703) 583-3837 E-mail: atwesternik@deq.virginia.gov Fax: (703) 583-3841

POTOMAC EMBAYMENTS  
WASTELOAD ALLOCATION STUDY  
FINAL REPORT, VOLUME I

Prepared for

Commonwealth of Virginia  
State Water Control Board  
2111 North Hamilton Street  
Richmond, Virginia 23230

Prepared by

Northern Virginia Planning District Commission  
7630 Little River Turnpike, Suite 400  
Annandale, Virginia 22003  
(Staff Technical Analysis)

With Technical Assistance Provided by  
Camp Dresser & McKee

June 12, 1987

POTOMAC EMBAYMENTS WASTELOAD ALLOCATION STUDY  
FINAL REPORT, VOLUME I:  
Study Methodology, Water Quality Goals,  
and Loading and Debugging of Computer Models

EXECUTIVE SUMMARY

The initial stages of the Potomac Embayments Wasteload Allocation Study lay the groundwork for the technical analyses that are performed to develop recommended effluent limits for point source discharges to seven Virginia embayments of the Potomac Estuary. First, modeling tools to be used in the study are obtained and tested. Next, a regionally consistent methodology for wasteload allocation analysis is developed. Finally, water quality goals are developed for use as evaluation criteria in screening wasteload allocation alternatives in later stages of the study.

Embayment hydrodynamics and water quality models developed by the Virginia Institute of Marine Science (VIMS) are obtained from VIMS and loaded onto the mainframe computer system used by NVPDC. The computer codes are modified as necessary to ensure successful operation on the system. The model codes are further modified to enhance their capability and, in several cases, to correct minor errors.

The regionally consistent methodology established for the study defines the modeling approach and the general procedures for establishing design conditions, defining water quality goals, performing sensitivity studies, and completing final wasteload allocation analyses. As part of the methodology, specific data for computer model application are developed, including nonpoint loadings, Potomac main stem boundary conditions, and design values for tidal ranges, streamflows, water temperature, and solar radiation.

The water quality goals established for the study focus primarily on concentrations of dissolved oxygen and chlorophyll-a. The selected dissolved oxygen goals are the Virginia state water quality standards of 5.0 mg/L daily average and 4.0 mg/L daily minimum. Chlorophyll-a goals are developed based on the concept of no further deterioration of existing conditions, which is consistent with the State's antidegradation policy. Specific chlorophyll-a goals are established for each embayment, primarily based on computer model simulations that show the impacts of point source loadings and Potomac main stem boundary conditions on chlorophyll-a concentrations throughout the embayment.

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## REFERENCES

## APPENDICES

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- APPENDIX F - Computer Model Source Codes, Sample Input Files, and Sample Output Files (bound separately)

POTOMAC EMBAYMENTS  
WASTELOAD ALLOCATION STUDY  
FINAL REPORT, VOLUME II

Prepared for

Commonwealth of Virginia  
State Water Control Board  
2111 North Hamilton Street  
Richmond, Virginia 23230

Prepared by

Northern Virginia Planning District Commission  
7630 Little River Turnpike, Suite 400  
Annandale, Virginia 22003

(Staff Technical Analysis)

With Technical Assistance Provided by  
Camp Dresser & McKee

June 12, 1987

POTOMAC EMBAYMENTS WASTELOAD ALLOCATION STUDY  
FINAL REPORT, VOLUME II:

Sensitivity Studies and Final Analyses for the  
Little Hunting Creek, Gunston Cove, Belmont-Occoquan Bay,  
and Aquia Creek Embayments

EXECUTIVE SUMMARY

In accordance with the regionally consistent methodology presented in the Volume I final report, NVPDC and CDM conduct sensitivity studies and final analyses for the Little Hunting Creek, Gunston Cove, Belmont-Occoquan Bay, and Aquia Creek embayments. Modeling tools developed by the Virginia Institute of Marine Science are used to predict the embayment water quality impacts of alternative treatment plant wasteloads. The modeling results are compared to water quality goals developed and presented in the Volume I final report to determine appropriate treatment plant effluent limits.

The sensitivity studies predict the extent to which embayment water quality would be affected by changes in parameters such as treatment plant loading, Potomac main stem boundary conditions, benthic flux rates, and treatment plant discharge location. After comparing the modeling results to the appropriate water quality goals, several different wasteload allocation alternatives for each embayment are selected for further analysis.

For the alternatives selected in the sensitivity studies, the final analyses include a comparison of wastewater treatment costs and of pollutant exchange between the embayment and the Potomac main stem. In addition, analyses of seasonal treatment limits for phosphorus and unoxidized nitrogen are conducted. The analysis of seasonal phosphorus removal is limited by a lack of data; as a result, no recommendations are made regarding the feasibility of seasonal phosphorus limits.

Based on the sensitivity studies and final analyses, the following effluent limits for dissolved oxygen (DO), 5-day carbonaceous biochemical oxygen demand (CBOD5), total Kjeldahl nitrogen (TKN), and total phosphorus (TP) are recommended for protection of embayment water quality:

EMBAYMENT	TREATMENT PLANT	PLANT FLOW (MGD)	RECOMMENDED EFFLUENT CONCENTRATION (mg/l)			
			DO	CBOD5	TKN	TP
Little Hunting Creek	Little Hunting Creek*	6.0	6.0	10.0	5.0**	0.20
Gunston Cove	Lower Potomac	54.0	6.0	10.0	---	0.30
Belmont-Occoquan Bay	Lorton	1.0	6.0	30.0	---	1.00
	Harbor View	0.08	6.0	10.0	---	1.00
Aquia Creek	Aquia	3.0	6.0	10.0	10.0**	0.20

\* Recommendation is based on the assumption of continued discharge from the plant to the Little Hunting Creek embayment. Fairfax County plans to close the plant, and has begun construction of pumpover facilities to the Lower Potomac Pollution Control Plant.

\*\* April 1 through October 31 only; no TKN limits November 1 through March 31.

To protect the main stem of the Potomac Estuary, an interim total phosphorus limit of 0.18 mg/L is regionally accepted as presented in the Interim Control Policy of the 1986 Supplement to the Metropolitan Washington 208 Plan. Therefore, at the present time, the more restrictive constraint on total phosphorus is the 0.18 mg/L limit for protection of the main stem of the Potomac. As indicated in the 208 Plan Supplement, long-term Potomac studies now under way will better define the total phosphorus limits required for protection of the Potomac main stem.

POTOMAC EMBAYMENTS  
WASTELOAD ALLOCATION STUDY  
FINAL REPORT, VOLUME III

Prepared for

Commonwealth of Virginia  
State Water Control Board  
2111 North Hamilton Street  
Richmond, Virginia 23230

Prepared by

Northern Virginia Planning District Commission  
7630 Little River Turnpike  
Annandale, Virginia 22003

(Staff Technical Analysis)

With Technical Assistance Provided by

Camp Dresser & McKee

June 30, 1988

POTOMAC EMBAYMENTS WASTELoad ALLOCATION STUDY  
FINAL REPORT, VOLUME III:

Sensitivity Studies and Final Analyses for the  
Four Mile Run, Hunting Creek, and Neabsco Creek Embayments

EXECUTIVE SUMMARY

In accordance with the regionally consistent methodology presented in the Volume I final report, NVPDC and CDM conduct sensitivity studies and final analyses for the Four Mile Run, Hunting Creek, and Neabsco Creek embayments. Modeling tools developed by the Virginia Institute of Marine Science are used to predict the embayment water quality impacts of alternative treatment plant wasteloads. The modeling results are compared to water quality goals developed and presented in the Volume I final report to determine appropriate treatment plant effluent limits.

The sensitivity studies predict the extent to which embayment water quality would be affected by changes in parameters such as treatment plant loading, Potomac main stem boundary conditions, benthic flux rates, and treatment plant discharge location. After comparing the modeling results to the appropriate water quality goals, several different wasteload allocation alternatives for each embayment are selected for further analysis.

For the alternatives selected in the sensitivity studies, the final analyses include a comparison of wastewater treatment costs and of pollutant exchange between the embayment and the Potomac main stem. In addition, analyses of seasonal treatment limits for phosphorus and unoxidized nitrogen are conducted. The analysis of seasonal phosphorus removal is limited by a lack of data; as a result, no recommendations are made regarding the feasibility of seasonal phosphorus limits. The analyses for the Hunting Creek and Four Mile Run embayments incorporate the results of a recently completed Metropolitan Washington Council of Governments study of dissolved oxygen in the upper Potomac Estuary.

Based on the sensitivity studies and final analyses, the following effluent limits for dissolved oxygen (DO), 5-day carbonaceous biochemical oxygen demand (CBOD5), total Kjeldahl nitrogen (TKN), and total phosphorus (TP) are recommended for protection of embayment water quality:

<u>EMBAYMENT</u>	<u>TREATMENT PLANT</u>	<u>PLANT FLOW (MGD)</u>	<u>RECOMMENDED EFFLUENT CONCENTRATION (mg/l)</u>			
			<u>DO</u>	<u>CBOD5</u>	<u>TKN</u>	<u>TP</u>
Four Mile Run	Arlington	40.0	6.0	10.0	---	1.00
Hunting Creek	Alexandria	54.0	7.6*	3.0	---	1.00
			7.6*	-or- 10.0	1.0**	1.00
Neabsco Creek	Dale City #1	4.0	6.0	10.0	---	1.00
	Dale City #8	2.0	6.0	10.0	---	1.00
	Mooney	20.0	6.0	10.0	---	1.00

---

\*April 1 through October 31 only; limit of 6.0 mg/L November 1 through March 31

\*\*April 1 through October 31 only; no TKN limit November 1 through March 31

To protect the main stem of the Potomac Estuary, an interim total phosphorus limit of 0.18 mg/l is regionally accepted as presented in the Interim Control Policy of the 1986 Supplement to the Metropolitan Washington 208 Plan. Therefore, at the present time, the more restrictive constraint on total phosphorus is the 0.18 mg/l limit for protection of the main stem of the Potomac. As indicated in the 208 Plan Supplement, long-term Potomac studies now under way will better define the total phosphorus limits required for protection of the Potomac main stem.



## COMMONWEALTH of VIRGINIA

STATE WATER CONTROL BOARD  
2111 Hamilton Street

Richard N. Burton  
Executive Director

Post Office Box 11143  
Richmond, Virginia 23230-1143  
(804) 257-0056

BOARD MEMBERS  
David H. Miller  
Chairman  
Watkins M. Abbitt,  
Vice-Chairman

Millard B. Rice, Jr.  
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Henry O. Hollimon

## A SPECIAL ORDER

## ISSUED TO

UNITED STATES MARINE CORPS, MARINE CORPS  
DEVELOPMENT & EDUCATION COMMAND, QUANTICO

## FOR THE

## MAINSIDE SEWAGE TREATMENT PLANT

This is a Special Order issued by the State Water Control Board ("Board") pursuant to Section 62.1-44.15(8) of the Code of Virginia to United States Marine Corps, Marine Corps Development and Education Command, Quantico and Col. C. M. Pisanchin, Assistant Chief of Staff Facilities, ("Marine Corps") which has voluntarily consented to issuance of this Order.

The Marine Corps owns and operates an advanced wastewater treatment facility called the Mainside Sewage Treatment Plant ("Mainside"). Mainside is the subject of NPDES Permit No. VA0028363, which was issued by the Board and became effective July 12, 1975 and is in the process of being reissued. The treated effluent from Mainside is discharged into the Potomac River. According to the Board's water quality standards, Mainside's discharge is subject to the Board's Potomac Embayment Standards. On October 21, 1981, the U.S. EPA conducted a study which indicated that there was no difference between the waters which receive the discharge (the so-called Quantico Bight) and the mainstem of the Potomac River. Further analysis of the study data by the staff confirmed that there is no difference between the waters of Quantico Bight and the Potomac River. At its meeting of September 26-28, 1982, the State Water Control Board directed the staff to "initiate procedures which would result in removing the Potomac Embayment Standards from Quantico Bight." Because this has not yet been done and the Mainside permit has expired, the issuance of this Order is necessary.

Accordingly, the Board hereby orders the Marine Corps to comply, and the Marine Corps hereby agrees to comply with the effluent limitations contained in Appendix A to this Order. The Board and the Marine Corps recognize that the effluent limits contained in Appendix A are interim limits which can and should be achieved through reasonable and prudent operation of the existing facilities at Mainside. Notwithstanding the imposition of effluent limits by this Order, the Order shall not be construed as altering, modifying, or amending any term or condition contained in NPDES Permit No. VA0028363. Once

the Board removes the Potomac Embayment Standards from Quantico Bight, NPDES Permit No. VA0028363 will be amended to include new final effluent limitations.

The Board orders the Marine Corps to submit and Marine Corps agrees to submit, within 30 days after the effective date of this Order, an approvable conceptual plan with an expeditious schedule for meeting the Potomac mainstem water quality limitations specifically a 0.18 mg/l phosphorus limit, if the existing treatment is not capable of meeting the final effluent limitations. This plan and schedule are subject to approval by the Executive Director. If the plan is rejected, the Marine Corps shall resubmit a plan within 30 days which corrects the objections to the plan. Upon approval by the Executive Director, the schedule will become a part of this Order.

The Marine Corps waives its right to a formal hearing on and to judicial review of this Order; the Marine Corps further waives its right to written findings of fact and conclusion of law to support this Order. Notwithstanding this waiver, the Marine Corps shall not be deemed to have waived in any future administrative or judicial proceeding their right to contest the factual basis upon which any allegation of violation of this Order may rest.

The Board may modify this Order for cause shown by the Marine Corps or on its own motion, after notice and opportunity for hearing. The Board, in its sole discretion, may cancel this Order upon thirty days written notice to the Marine Corps.

This order shall become effective upon the date of its execution by the Executive Director of the Board or his designee.

STATE WATER CONTROL BOARD

Date: JUN 18 1986

By:   
Executive Director

The terms and conditions of this Order are voluntarily accepted by the Marine Corps.

U. S. MARINE CORPS

Date: 3- 27- 86

By: 

Title Assistant Chief of Staff, Facilities

## INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the Order's effective date and lasting until cancellation of this Order, the Marine Corps shall limit and monitor the discharge from outfall serial number 001 as specified below:

These requirements shall be construed in light of the Board's Regulation No. 6.

EFFLUENT CHARACTERISTICS

DISCHARGE LIMITATIONS  
Monthly Average      Weekly Average

MONITORING REQUIREMENTS  
Frequency      Sample Type

					<u>Instantaneous Limitation</u>			
					<u>Min.</u>	<u>Max.</u>		
Flow-M <sup>3</sup> /Day (MGD)*	- -		- -		--	--	continuous	totalizing, indicating & recording equip.
BOD <sub>5</sub>	10 mg/l	76 kg/d	15 mg/l	114 kg/d	- -	- -	7 d/wk	24 HC
Suspended Solids	10 mg/l	76 kg/d	15 mg/l	114 kg/d	- -	- -	7 d/wk	24 HC
Cl <sub>2</sub> Residual (mg/l) <sup>(2)**</sup>	- -	- -	- -	- -	- -	- -	12/d, 2hr.int.	Grab
pH (standard units)	- -	- -	- -	- -	6.0	9.0	1/d	Grab
Dissolved oxygen (mg/l)	- -	- -	- -	- -	6.0	- -	1/d	Grab
Total Phosphorus	.50 mg/l	3.8 kg/d	0.75 mg/l	5.7 kg/d	- -	- -	7 d/wk	24 HC
Fecal coliform (n/100ml)	200	- -	400	- -	- -	- -	1d/wk(10:00 a.m. to 4:00 p.m.)	Grab

2. (a) No more than 90 of all total chlorine residual analyses shall be outside the range 1.5 through 2.5 milligrams per liter for any calendar month.  
 (b) Any 3 consecutive test results not within the range 1.0 through 3.5 milligrams per liter shall be immediately reported in accordance with paragraph A(7)(a) of Part II of NPDES Permit No. VA0023863.  
 (c) No single chlorine residual analysis shall exceed 4.0 milligrams per liter at any time.
3. There shall be no discharge of floating solids or visible foam in other than trace amounts.
4. Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Point Source 001.

\* The design flow of this treatment facility is 2.0 MGD.

\*\*Once the final disinfection strategy is implemented, the chlorine limits contained in this order shall be modified to comply with the strategy.

# MEMORANDUM

## State Water Control Board

2111 North Hamilton Street

P. O. Box 11143

Richmond, VA. 23230

SUBJECT: Revoking of Special Standards for Quantico Bight  
TO: Martin Ferguson  
FROM: Jean Gregory *JE*  
DATE: January 22, 1986  
COPIES: Tom Felvey, Stu Wilson, Mary Reid, Cindy Berndt-OPA,  
Jeanie Grandstaff-OE, Fred Holt-OWRM, file

I have independently discussed with Jeanie Grandstaff, Cindy Berndt, Fred Holt and John Butcher:

- a) the history of the Board decision that Quantico Bight physically resembled the main stem of the Potomac River rather than an embayment, and
- b) the steps needed to revoke the special standards for this section.

Unfortunately, this can not be considered a technical or clerical error, so we will have to proceed through the normal 6-8 month process to remove the special conditions given for this segment in the river basin tables and maps of the Water Quality Standards. John Butcher said that the permit would carry the special embayment requirement and a special order should be issued specifying the date by which special condition b would be revoked.

Please advise which of the following 3 options you wish the Standards group to follow in revoking the special condition for Quantico Bight:

- 1) Initiate the process now with removal of the condition effective in 6-8 months.
- 2) Include this as part of the 1987 triennial review with an effective date of November 1987.
- 3) Include this with the Potomac Embayment hearings in the summer of 1987 with an effective date of late 1987 or early 1988.

:

# MEMORANDUM

2111 North Hamilton Street

## State Water Control Board

P. O. Box 11143

Richmond, VA. 23230

SUBJECT: Quantico, Mainside VA0028363  
TO: W. L. Woodfin  
FROM: *Martin G. Ferguson, Jr.*  
Martin G. Ferguson, Jr.  
DATE: January 10, 1986  
COPIES: OERS - Anthony, OE , NRO

### ISSUE

The subject permit discharges into Quantico Bight of the Potomac River. According to the Water Quality Standards effective December 12, 1981, special standard b (Potomac Embayment Standards) applies to this area of the Potomac River Basin.

The Bight is a shallow indentation of the Potomac River shoreline. Because of this characteristic, the staff in 1982 reevaluated the applicability of the Potomac Embayment Standards to Quantico Bight. As a result of the staff's reevaluation, it was determined that the Potomac Embayment Standards are not applicable to Quantico Bight and the Mainside STP.

The Board at its September 1982 meeting ratified Letter Ballot 4948 which directed the staff to initiate procedures to remove the Potomac Embayment Standards from Quantico Bight.

Upon preparation of the permit package, it was discovered that for whatever reason the Water Quality Standards were never modified to remove the Potomac Embayment Standards from the Bight. Consequently, the permit as proposed is in conflict with the Water Quality Standards.

### ACTION

It is suggested that the permit package be modified to reflect the Potomac Embayment Standards with the current final limits being incorporated in a Consent Order as interim limits, similar to the current course of action being pursued with the other Potomac Embayment permits. Once the Potomac Embayment Strategy is finalized, and the Water Quality Standards are modified, the permit can be modified accordingly.

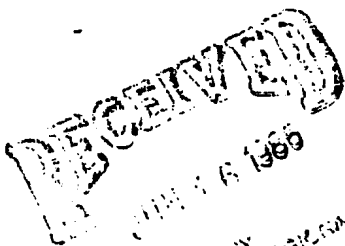
### STANDARDS CHANGE

One other issue that should be discussed is the initiation of the modification to the Water Quality Standards. OERS (memo attached) has indicated that the modification can begin immediately and would take approximately 6-8 months. At the same time the Potomac Strategy is proceeding with Water Quality Standards changes expected in mid 1987. The question arises as to whether OERS should initiate Water Quality Standards changes now or wait and incorporate these changes relative to Quantico Bight with the changes resulting from the Potomac Strategy in 1987.

It appears that once the paperwork is in place for the Quantico Mainside permit, it would make little difference if the Standards changes were accomplished within 6-8 months or within the timeframe for the Potomac Strategy changes.

A further concern we need to have researched is whether or not there are other Standard changes which have been overlooked.

ns



*Robert*  
*See: Minutes 7/16/86*

*post*

BY  
NOTARIAL PUBLIC  
OFFICE

# COMMONWEALTH of VIRGINIA

Richard N. Burton  
Executive Director

STATE WATER CONTROL BOARD  
2111 Hamilton Street

Post Office Box 11143  
Richmond, Virginia 23230-1143  
(804) 257-0056

## NOTICE OF HEARING

BOARD MEMBERS  
David H. Miller  
Chairman

Millard B. Rice, Jr.  
Joseph S. Cragwall, Jr.  
Patrick L. Standing  
Robert C. Wininger  
Henry O. Hollimon, Jr.  
W. Bidgood Wall, Jr.

The Virginia State Water Control Board will convene a public hearing to receive data, views and arguments concerning a proposed amendment of the Water Quality Standards for the Quantico Bight in the Potomac River Subbasin. The hearing is being held pursuant to Section 9-6.14:7 and Section 62.1-44.15(3) of the Code of Virginia. It will be held on August 11, 1986, at 7:00 p.m., in the Prince William County Complex, 4850 Davis Ford Road, Woodbridge, Virginia.

The purpose of this proposed amendment is to establish the Quantico Bight and its tidal tributaries as a separate section, Section 5C, in the Potomac River Subbasin. This Section 5C would establish the requirements of Class II waters with no special standards for Quantico Bight and its tidal tributaries. At the present time, the Quantico Bight is classified as part of Section 5, which requires meeting the requirements for Class II waters as well as Special Standard b, the Potomac Embayment Standards.

This amendment is being proposed because a water quality study performed by the Board and the Environmental Protection Agency (EPA) in 1982 found that the water quality of the Quantico Bight is not different from the water quality of the Potomac River and therefore the standards for the Potomac Embayments should not be applicable.

An information sheet containing the specific changes is available from Stu Wilson, Water Resources Ecologist, State Water Control Board, Office of Environmental Research and Standards, 2111 North Hamilton Street, P. O. Box 11143, Richmond, Virginia 23230, (804) 257-0387.

Persons wishing to offer testimony orally at the hearing may do so subject to any limitations imposed by the hearing officer. Anyone wishing to offer written comments should present a copy and all exhibits referenced therein at the time of the hearing or should mail them so that they are received on or before August 21, 1986, when the hearing record will close. Statements should include the name, address, and telephone number of the presenter and should set out, completely and concisely, the factual basis for the statement. The statements should be addressed to Doneva Dalton, State Water Control Board, Office of Policy Analysis, P. O. Box 11143, Richmond, Virginia 23230.

STATE WATER CONTROL BOARD  
WATER QUALITY STANDARDS PROPOSED AMENDMENT TO  
ESTABLISH A NEW BASIN AND SECTION  
DESCRIPTION AND REQUIREMENTS FOR  
QUANTICO BIGHT AND ITS TIDAL TRIBUTARIES

Fact Sheet

The purpose of this proposed amendment is to establish the Quantico Bight and its tidal tributaries as a separate section, Section 5C, in the Potomac River Subbasin. This Section 5C would establish the requirements of Class II waters with no special standards for Quantico Bight and its tidal tributaries. At the present time, Quantico Bight and its tributaries are classified as part of Section 5, which requires meeting the requirements for Class II waters as well as Special Standard b, the Potomac Embayment Standards which establish strict limits for biochemical oxygen demand, nitrogen and phosphorus. Section 5 will be amended to exclude Quantico Bight and its tidal tributaries. The following standards will apply to Section 5C, Class II - Estuarine Waters:

Dissolved Oxygen mg/l

<u>Minimum</u>	<u>Daily Average</u>	<u>pH</u>	<u>Max. Temp.</u>
4.0	5.0	6.0-9.0	--

Dischargers into Quantico Bight would also be required to meet the nutrient limits set by the State/EPA interim control strategy.

TEXT OF PROPOSED AMENDMENT

The text of the proposed amendment follows. Proposed additions are underlined, deletions are struck through.

POTOMAC RIVER BASIN  
POTOMAC SUBBASIN

<u>SECTION</u>	<u>BASIN AND SECTION DESCRIPTION</u>	<u>CLASS</u>	<u>SPECIAL STANDARDS</u>
5	Tidal portions of tributaries to the Potomac River from Brent Point to Shipping Point, including tidal portions of Chopawamsic Creek and its tidal tributaries, <u>but excluding Quantico Bight and its tidal tributaries.</u>	II	b
5C	<u>Quantico Bight and its tidal tributaries.</u>	II	

## General Notices/Errata

Contact: John W. Braymer, Executive Director, P.O. Box 27708, Richmond, Va. 23261, telephone (804) 786-3434

### VIRGINIA BOARD OF SOCIAL WORK

#### † Notice of Intended Regulatory Action

Notice is hereby given in accordance with this agency's public participation guidelines that the Virginia Board of Social Work intends to consider promulgating or repealing regulations entitled: Regulations Governing the Practice of Social Work and Clinical Social Work. The purpose of the proposed regulations is to establish the requirements for licensure as clinical social workers and social workers in Virginia, to regulate the licensure of clinical social workers and social workers and to discharge the duties required of the board pursuant to § 54-929 of the Code of Virginia in protecting the health, safety and welfare of the citizens of the Commonwealth.

Statutory Authority: § 54-929 of the Code of Virginia.

Written comments may be submitted no later than May 28, 1986.

Other pertinent information: The regulations to be proposed follow a comprehensive review of existing regulations in 1984 and 1985.

Contact: John W. Braymer, Executive Director, 517 W. Grace St., P.O. Box 27708, Richmond, Va. 23261, telephone (804) 786-7703

### DEPARTMENT OF TAXATION

#### Notice of Intended Regulatory Action

Notice is hereby given in accordance with this agency's public participation guidelines that the Department of Taxation intends to consider promulgating regulations entitled: VR 630-10-49.2. Innovative High Technology Industries and Research (Virginia Retail Sales and Use Tax Regulation). The purpose of the proposed regulation is to formally adopt under the Administrative Process Act an emergency regulation adopted on January 16, 1986, and published in the February 17, 1986, issue of the Virginia Register of Regulations. The regulation will set forth the application of the sales and use tax to high technology businesses, including the broad industrial manufacturing and research and development exemptions generally available to such businesses.

Statutory Authority: § 58.1-203 of the Code of Virginia.

Written Comments: This date has been extended from

~~April 16 until May 28, 1986.~~

Contact: Danny M. Payne, Director, Tax Policy Division, Department of Taxation, P.O. Box 6-L, Richmond, Va. 23262, telephone (804) 257-8010.

### STATE WATER CONTROL BOARD

#### † Notice of Intended Regulatory Action

Notice is hereby given in accordance with this agency's public participation guidelines that the State Water Control Board intends to consider amending regulations entitled: Water Quality Standards (Basin and Section Description Tables), Section 5, Potomac River Subbasin. The proposed change would establish Quantico Bight and its tidal tributaries as a separate Section, 5C, Class II water, no special standards, Potomac River Subbasin. Section 5 would be amended to exclude Quantico Bight from this section.

Statutory Authority: § 62.1-44.15(3a) of the Code of Virginia.

Written comments may be submitted until May 12, 1986 to Cindy M. Berndt, State Water Control Board, P.O. Box 11143, Richmond, Virginia 23230

Other pertinent information: This amendment would remove the Potomac Embayment Standards from Quantico Bight.

#### † Notice of Intended Regulatory Action

Notice is hereby given in accordance with this agency's public participation guidelines that the State Water Control Board intends to consider amending regulations entitled: Commonwealth of Virginia Water Quality Standards. The purpose of considering the proposed amendments is to ensure that the standards protect water quality and beneficial water uses, conform to federal regulations and that obsolete standards are cancelled.

Statutory Authority: § 62.1-44.15(3a) of the Code of Virginia and § 303 of the Federal Clean Water Act.

Other pertinent information: The board's Water Quality Standards are reviewed every three years, as mandated by state and federal law.

Contact: Stu Wilson, Water Resource Ecologist, State Water Control Board, P.O. Box 11143, Richmond, Va. 23230, telephone (804) 257-0387

9 VAC 25-415-10 ET SEQ. - Policy for the Potomac River Embayments

## 9 VAC 25-415-10. Purpose.

This chapter provides for the control of point source discharges into the Virginia embayment waters of the Potomac River from the fall line at Chain Bridge in Arlington County to the Route 301 Bridge in King George County.

This chapter also constitutes Special Standard 'b' in the State Water Control Board's Water Quality Standards "Special Standards and Requirements" (9 VAC 25-260-310) for the Potomac River Basin's Potomac River Subbasin (9 VAC 25-260-390).

## 9 VAC 25-415-20. Affected waters.

This chapter shall apply to all embayments and their tidal and non-tidal tributaries, including their headwaters, of the Potomac River, from the fall line at Chain Bridge in Arlington County to the Route 301 Bridge in King George County. The Occoquan River watershed, upstream of the fall line at the Occoquan Dam, shall not be subject to the terms of this chapter, since those waters are governed by the Occoquan Policy (9 VAC 25-410-10 et seq.).

## 9 VAC 25-415-30. Policy requirements.

A. Existing discharges shall meet the requirements of 9 VAC 25-415-40 within five years from the effective date of this chapter, unless exempted under subsection B., C., or D of this section. New dischargers shall meet the requirements of 9 VAC 25-415-40 immediately.

B. Existing discharges with design flows less than 0.05 mgd shall be exempt from meeting the requirements of 9 VAC 25-415-40 until the completion of their next design flow expansion.

C. Failing Septic Systems - Existing residential homes, industrial and commercial operations, public facilities, and any other operation where a septic drainfield system has failed shall be exempt from the requirements of 9 VAC 25-415-40, provided that the applicant demonstrates that it is not feasible to connect to a publicly-owned treatment plant and that there is no feasible alternative except to discharge. Discharge permits shall be issued in conformance with the Virginia Permit Regulation (9 VAC 25-31-10 et seq.) and Virginia General VPDES Permit Regulation for sewage discharges less than or equal to 1,000 gallons per day (9 VAC 25-110-10 et seq.).

D. Other Exemptions - The requirements of 9 VAC 25-415-40 shall not apply to the following types of discharges: combined sewer overflows, stormwater, corrective action remediation, and industrial discharges where BOD and nutrients are not primary pollutants of concern.

9 VAC 25-415-10 ET SEQ. - Policy for the Potomac River Embayments

9 VAC 25-415-40. Effluent limitations.

The following effluent limitations shall apply to all sewage treatment plants:

<u>Parameter</u>	<u>Monthly Avg (mg/l)</u>
CBOD <sub>5</sub>	5
Total Suspended Solids	6
Total Phosphorus	0.18
NH <sub>3</sub> (Apr 1 - Oct 31)	1

The above limitations shall not replace or exclude the discharge from meeting the requirements of the State's Water Quality Standards (9 VAC 25-260-10 et seq.).

9 VAC 25-415-50. Water quality modeling.

Water quality models may be required to predict the effect of wastewater discharges on the water quality of the receiving waterbody, the embayment, and the Potomac River. The purpose of the modeling shall be to determine if more stringent limits than those required in 9 VAC 25-415-40 are required to meet water quality standards. If modeling demonstrates the necessity for more restrictive limits, the more restrictive limits shall apply. Where needed, modeling shall account for and address previous modeling exercises and shall include all relevant point and non-point sources. All models shall undergo a peer review process. The models and modeling results shall be considered during the public participation process to ensure proper public input into the modeling process. The models shall be documented and certified by the Virginia Department of Environmental Quality for use in preparing VPDES permits for discharges to the Potomac Embayments and the Potomac River. All changes and modifications to the models shall receive peer review and be appropriately documented. Documentation on the models shall include the basis and reasoning for the recommended models including inputs and assumptions. The rationale shall be described in non-technical language so someone who is reasonably familiar with water pollution problems can understand the inputs and the reasons behind them.

9 VAC 25-415-60. Administrative review.

Within three years after the effective date of this chapter, the department shall perform an analysis on this chapter and provide the board with a report on the results. The analysis shall include (i) the purpose and need for the chapter, (ii) alternatives which would achieve the stated

9 VAC 25-415-10 ET SEQ. - Policy for the Potomac River Embayments

purpose of this chapter in a less burdensome and less intrusive manner, (iii) an assessment of the effectiveness of this chapter, (iv) the results of a review of current state and federal statutory and regulatory requirements, including identification and justification of requirements of this chapter which are more stringent than federal requirements, and (v) the results of a review as to whether this chapter is clearly written and easily understandable by affected entities.

Upon review of the department's analysis, the board shall confirm the need to (i) continue this chapter without amendment, (ii) repeal this chapter or (iii) amend this chapter. If the board's decision is to repeal or amend this chapter, the board shall authorize the department to initiate the applicable regulatory process to carry out the decision of the board.

**State "Transmittal Checklist" to Assist in Targeting  
Municipal and Industrial Individual NPDES Draft Permits for Review**

**Part I. State Draft Permit Submission Checklist**

In accordance with the MOA established between the Commonwealth of Virginia and the United States Environmental Protection Agency, Region III, the Commonwealth submits the following draft National Pollutant Discharge Elimination System (NPDES) permit for Agency review and concurrence.

Facility Name:	<u>Quantico Mainside WWTP</u>
NPDES Permit Number:	<u>VA0028363</u>
Permit Writer Name:	<u>Anna Westernik</u>
Date:	<u>November 7, 2007</u>

**Major [X]****Minor [ ]****Industrial [ ]****Municipal [X]****I.A. Draft Permit Package Submittal Includes:**

	Yes	No	N/A
1. Permit Application?	X		
2. Complete Draft Permit (for renewal or first time permit – entire permit, including boilerplate information)?	X		
3. Copy of Public Notice?	X		
4. Complete Fact Sheet?	X		
5. A Priority Pollutant Screening to determine parameters of concern?	X		
6. A Reasonable Potential analysis showing calculated WQBELs?	X		
7. Dissolved Oxygen calculations?		X	
8. Whole Effluent Toxicity Test summary and analysis?	X		
9. Permit Rating Sheet for new or modified industrial facilities?			X

**I.B. Permit/Facility Characteristics**

	Yes	No	N/A
1. Is this a new, or currently unpermitted facility?		X	
2. Are all permissible outfalls (including combined sewer overflow points, non-process water and storm water) from the facility properly identified and authorized in the permit?	X		
3. Does the fact sheet or permit contain a description of the wastewater treatment process?	X		
4. Does the review of PCS/DMR data for at least the last 3 years indicate significant non-compliance with the existing permit?		X	
5. Has there been any change in streamflow characteristics since the last permit was developed?		X	
6. Does the permit allow the discharge of new or increased loadings of any pollutants?		X	
7. Does the fact sheet or permit provide a description of the receiving water body(s) to which the facility discharges, including information on low/critical flow conditions and designated/existing uses?	X		
8. Does the facility discharge to a 303(d) listed water?	X		
a. Has a TMDL been developed and approved by EPA for the impaired water?	X		
b. Does the record indicate that the TMDL development is on the State priority list and will most likely be developed within the life of the permit?			X
c. Does the facility discharge a pollutant of concern identified in the TMDL or 303(d) listed water?		X	
9. Have any limits been removed, or are any limits less stringent, than those in the current permit?		X	
10. Does the permit authorize discharges of storm water?		X	

<b>I.B. Permit/Facility Characteristics – cont.</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
11. Has the facility substantially enlarged or altered its operation or substantially increased its flow or production?		X	
12. Are there any production-based, technology-based effluent limits in the permit?		X	
13. Do any water quality-based effluent limit calculations differ from the State's standard policies or procedures?		X	
14. Are any WQBELs based on an interpretation of narrative criteria?		X	
15. Does the permit incorporate any variances or other exceptions to the State's standards or regulations?		X	
16. Does the permit contain a compliance schedule for any limit or condition?		X	
17. Is there a potential impact to endangered/threatened species or their habitat by the facility's discharge(s)?		X	
18. Have impacts from the discharge(s) at downstream potable water supplies been evaluated?			X
19. Is there any indication that there is significant public interest in the permit action proposed for this facility?		X	
20. Have previous permit, application, and fact sheet been examined?	X		

## Part II. NPDES Draft Permit Checklist

### Region III NPDES Permit Quality Checklist – for POTWs (To be completed and included in the record only for POTWs)

#### II.A. Permit Cover Page/Administration

	Yes	No	N/A
1. Does the fact sheet or permit describe the physical location of the facility, including latitude and longitude (not necessarily on permit cover page)?	X		
2. Does the permit contain specific authorization-to-discharge information (from where to where, by whom)?	X		

#### II.B. Effluent Limits – General Elements

	Yes	No	N/A
1. Does the fact sheet describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)?	X		
2. Does the fact sheet discuss whether “antibacksliding” provisions were met for any limits that are less stringent than those in the previous NPDES permit?	X		

#### II.C. Technology-Based Effluent Limits (POTWs)

	Yes	No	N/A
1. Does the permit contain numeric limits for <u>ALL</u> of the following: BOD (or alternative, e.g., CBOD, COD, TOC), TSS, and pH?	X		
2. Does the permit require at least 85% removal for BOD (or BOD alternative) and TSS (or 65% for equivalent to secondary) consistent with 40 CFR Part 133?	X		
a. If no, does the record indicate that application of WQBELs, or some other means, results in more stringent requirements than 85% removal or that an exception consistent with 40 CFR 133.103 has been approved?			X
3. Are technology-based permit limits expressed in the appropriate units of measure (e.g., concentration, mass, SU)?	X		
4. Are permit limits for BOD and TSS expressed in terms of both long term (e.g., average monthly) and short term (e.g., average weekly) limits?	X		
5. Are any concentration limitations in the permit less stringent than the secondary treatment requirements (30 mg/l BOD5 and TSS for a 30-day average and 45 mg/l BOD5 and TSS for a 7-day average)?		X	
a. If yes, does the record provide a justification (e.g., waste stabilization pond, trickling filter, etc.) for the alternate limitations?			X

#### II.D. Water Quality-Based Effluent Limits

	Yes	No	N/A
1. Does the permit include appropriate limitations consistent with 40 CFR 122.44(d) covering State narrative and numeric criteria for water quality?	X		
2. Does the fact sheet indicate that any WQBELs were derived from a completed and EPA approved TMDL?		X	
3. Does the fact sheet provide effluent characteristics for each outfall?	X		
4. Does the fact sheet document that a “reasonable potential” evaluation was performed?	X		
a. If yes, does the fact sheet indicate that the “reasonable potential” evaluation was performed in accordance with the State’s approved procedures?	X		
b. Does the fact sheet describe the basis for allowing or disallowing in-stream dilution or a mixing zone?	X		
c. Does the fact sheet present WLA calculation procedures for all pollutants that were found to have “reasonable potential”?	X		
d. Does the fact sheet indicate that the “reasonable potential” and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations)?		X	
e. Does the permit contain numeric effluent limits for all pollutants for which “reasonable potential” was determined?	X		

<b>II.D. Water Quality-Based Effluent Limits – cont.</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
5. Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the fact sheet?	X		
6. For all final WQBELs, are BOTH long-term AND short-term effluent limits established?	X		
7. Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)?	X		
8. Does the record indicate that an “antidegradation” review was performed in accordance with the State’s approved antidegradation policy?	X		

<b>II.E. Monitoring and Reporting Requirements</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
1. Does the permit require at least annual monitoring for all limited parameters and other monitoring as required by State and Federal regulations?	X		
a. If no, does the fact sheet indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver?			
2. Does the permit identify the physical location where monitoring is to be performed for each outfall?	X		
3. Does the permit require at least annual influent monitoring for BOD (or BOD alternative) and TSS to assess compliance with applicable percent removal requirements?		X	
4. Does the permit require testing for Whole Effluent Toxicity?	X		

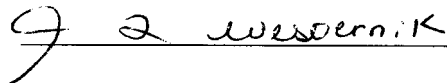
<b>II.F. Special Conditions</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
1. Does the permit include appropriate biosolids use/disposal requirements?	X		
2. Does the permit include appropriate storm water program requirements?			X

<b>II.F. Special Conditions – cont.</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
3. If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements?			X
4. Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations?	X		
5. Does the permit allow/authorize discharge of sanitary sewage from points other than the POTW outfall(s) or CSO outfalls [i.e., Sanitary Sewer Overflows (SSOs) or treatment plant bypasses]?		X	
6. Does the permit authorize discharges from Combined Sewer Overflows (CSOs)?		X	
a. Does the permit require implementation of the “Nine Minimum Controls”?			X
b. Does the permit require development and implementation of a “Long Term Control Plan”?			X
c. Does the permit require monitoring and reporting for CSO events?			X
7. Does the permit include appropriate Pretreatment Program requirements?			X

II.G. Standard Conditions			Yes	No	N/A
1. Does the permit contain all 40 CFR 122.41 standard conditions or the State equivalent (or more stringent) conditions?			X		
List of Standard Conditions – 40 CFR 122.41					
Duty to comply	Property rights	Reporting Requirements			
Duty to reapply	Duty to provide information	Planned change			
Need to halt or reduce activity	Inspections and entry	Anticipated noncompliance			
not a defense	Monitoring and records	Transfers			
Duty to mitigate	Signatory requirement	Monitoring reports			
Proper O & M	Bypass	Compliance schedules			
Permit actions	Upset	24-Hour reporting			
		Other non-compliance			
2. Does the permit contain the additional standard condition (or the State equivalent or more stringent conditions) for POTWs regarding notification of new introduction of pollutants and new industrial users [40 CFR 122.42(b)]?			X		

### Part III. Signature Page

Based on a review of the data and other information submitted by the permit applicant, and the draft permit and other administrative records generated by the Department/Division and/or made available to the Department/Division, the information provided on this checklist is accurate and complete, to the best of my knowledge.

Name	<u>Anna T. Westernik</u>
Title	<u>Environmental Specialist II</u>
Signature	<u></u>
Date	<u>November 7, 2007</u>